COAL AGE

A McGRAW-HILL PUBLICATION

FEBRUARY, 1958

Annual Review Issue

PRICE $1

Coal in Review
How the industry fared in 1957; what's ahead in 1958 p 76

Business in 1958
Probable course and the factors affecting it p 83

Utility Coal Tomorrow
The growth in power capacity and its meaning to coal p 84

Operating Review
Deep mining, stripping and preparation developments p 96

Mining Trends
What's doing in production, preparation and services p 104

Safety Developments
Gains and losses in 1957, problems of the future p 110

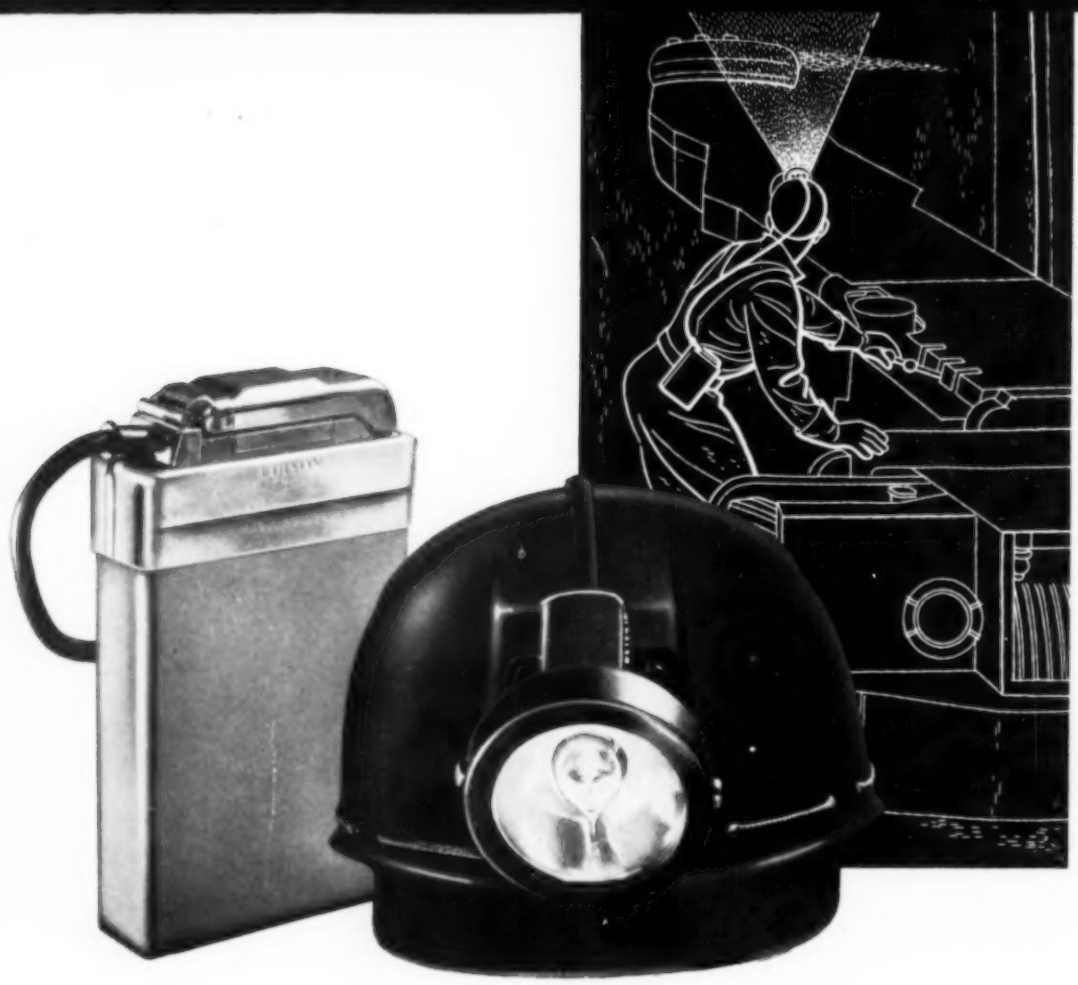
Mining-Equipment Sales
Industry purchases of mining and cleaning units p 114

Rope Belts; Continuous Mining
How new mining system utilizes new mining equipment p 124

Cables for Strip Mines
Major service hazards and how to minimize them p 140

Ripping Coal for Loading
New technique saves money at strip-coal mines p 148

Tipple Dust Control
Sprays with chemical additive economical answer p 154



Mechanization returns greater dividends with Edison R-4 Cap Lamps on the job

Edison R-4 Electric Cap Lamps can help modern mining machines realize their *full* potential.

Reason why? Because more and better light is always on the job with the brilliant, unfailing beam of the Edison R-4. This dependable source of illumination permits the miner to perform his duties with utmost efficiency and safety. You don't have long to wait for results with the Edison R-4, either. They register quickly in terms of accident prevention and increased tonnage per man-shift.

Let us demonstrate the advantages of this *quality* cap lamp in your underground operation. Write or call us soon for more detailed information.

MSA
SAFETY EQUIPMENT HEADQUARTERS

MINE SAFETY APPLIANCES COMPANY
201 North Braddock Avenue, Pittsburgh 8, Pa.
At Your Service: 76 Branch Offices in the United States

MINE SAFETY APPLIANCES CO. OF CANADA, LIMITED
Toronto, Montreal, Calgary, Edmonton, Winnipeg, Vancouver, Sydney, N.S.
Representatives in Principal Cities in Mexico, Central and South America
Cable Address: "MINSAF" Pittsburgh

B.F.Goodrich report:

Now they burn coal refuse to make lighter building blocks

B. F. Goodrich improvements in rubber brought extra savings

Problem: Those steaming hot cinders on that conveyor belt are burned coal refuse. Once thrown away as useless, the refuse is now used to make an improved, lightweight building block.

After cooking at a white hot 2500 degrees, the cinders are sprayed with water, but are still plenty hot when they're dumped on the conveyor belt to be carried to storage. This heat, plus the wear and tear from sharp, jagged cinder edges, ruined a belt made of asbestos in only 30 days.

What was done: When a B.F.Goodrich distributor heard of the problem, he recommended a B.F.Goodrich belt that's made to carry such hot materials as coke, hot sand, lime. This belt is made with a special heat-resisting rubber that can stand temperatures that would char or burn ordinary rubber belts.

Savings: The B.F.Goodrich belt was put to work and lasted 20 months—far longer than the asbestos belt it replaced. The belt worked around the clock, 7 days a week, carrying 120 tons of hot cinders a day. There was not one shutdown for maintenance or repairs.

Where to buy: Your B.F.Goodrich distributor has the exact specifications on the belt that solved the problem in this plant. And, as a factory-trained specialist in rubber products, he *can* answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Co., Dept. M-282, Akron 18, O.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

Hulburt

Quality Lubricants . . .

used by those who want to—
reduce down time—increase production

Proper maintenance is the key to less down time and a longer operating life for your mining equipment. In turn, Hulburt Quality Lubricants are the key to proper maintenance and protective servicing—prime factors in adding many hours of productive operation to the life of your equipment.

Hulburt Quality Lubricants have the field-proven, time-honored reputation for being the most dependable, low consumption lubricants available to the mining industry. This tradition for recognized product quality is your assurance that your equipment will operate *longer*, with *less down time*, under the most rugged and extreme conditions and schedules.

Your keys to better lubrication . . .

AP GREASE
Hulburt's famous "strawberry grease" containing DuPont's Estersil. It's finer because it has no melting point; is completely water-resistant and gives more hours of added lube protection.

No. 11 LUBRICANTS
Top quality lubricants for hydraulic systems and gear cases—recommended because of highest film strength and guaranteed oxidation, rust and anti-foam protection.

Contact your Hulburt representative today. Start right away on the Hulburt lubrication method of protecting your expensive mining equipment.

Hulburt

OIL AND GREASE COMPANY
Philadelphia 34, Pa.
Specialists in Quality Lubricants for the Coal Mining Industry

Hulburt AP Grease

now available in:

FULL DRUM
55 GALS.

QUARTER DRUM

PAIL—38 lbs.

CARTRIDGE—1 lb.

This is the way

TO DEWATER YOUR FINE COAL

—that does the job and keeps on doing it for 3000 hours without so much as changing a screen.

—that calls for only ¼ HP-Hour per ton of dewatered coal.

—that delivers up to 70 tons or more of coal per hour and can get it down to 5% or less surface moisture.

—that turns out a filtrate containing no more than 3 to 5% solids throughout the entire life of the screen.

—that *does not* degrade even the most friable coal.

The BIRD-HUMBOLDT Screen Centrifuge

Let us tell you all about it and what it can save *you*.

BIRD
MACHINE COMPANY

SOUTH WALPOLE, MASSACHUSETTS
Regional Offices:
EVANSTON, ILL. • WALNUT CREEK, CALIF. • ATLANTA, GA.

This Month in COAL AGE

FEBRUARY 1958

Features this month:

Editorial	p 75
Strength in Adversity	p 76
Business in 1958	p 83
Coal for Electric Power: 1958-75	p 84
1957 Developments in Mining, Stripping and Preparation	p 96
Trends in Coal Mining Today and Tomorrow	p 104
Safety in 1957	p 110
1957 Sales of Mining Equipment	p 114
Rope Belts Boost Efficiency at Peabody Coal	p 124
Portable Cables for Surface Mining	p 140
Ripping Coal for Loading	p 148
Tipple Dust Control	p 154

Departments this month:

Coal Commentator p 12 — News Roundup p 26
Foremen's Forum p 164 — Operating Ideas p 168
Equipment Developments p 178

► Coal Outlook

Strength in Adversity p 76

Business in 1958 p 83

Both bituminous and anthracite chalked up tonnage records in '57 which showed ability to resist the downward pressure of general business activity and other adverse market conditions. Bituminous hit about 483 million tons—within 2.6% of the '56 mark; anthracite fell 2.9 million tons to 25.2 millon tons. This year, anthracite should at least hold to the 25 to 26-million ton level. If the second half pickup comes, bituminous could rebound to 503 million tons; if not, production could go as low as 475 million tons. High on soft coal's management agenda: legislation to improve competitive status and continued emphasis on long-range problems such as personnel training and recruitment, property modernization and expansion, more effective merchandising and expanded research.

Featured—Bituminous market highlights.

► Utilization

Coal for Electric Power: 1958-75 p 84

W. A. Raleigh Jr., Assistant Editor, *Coal Age*

Coal's electric power market should grow from 162 million tons in 1957 to minimums of 191 million tons in 1960, 292 million tons in 1965, 390 million tons in 1970 and 467 million tons in 1975. These predictions assume that coal at the worst will hold its present 70% share of the fossil-fuel power market. However, prospects for above-minimum tonnages are excellent as coal widens its price advantages over competitive fuels through further mechanization and higher labor productivity. Also critical to higher tonnages: adequate expansion of mine capacity, more research, and closer cooperation with utilities.

Highlights—New Bergen (N. J.) generating plant; Washington Report—Coal vs. Oil & Gas; survey data on 1957-61, coal-tonnage use by leading utilities.

► Technical Developments

1957 Developments in Mining p 96

Deep Mining—New types of continuous miners permit thin-seam exploitation. AC power at the face attracts increasing interest. Mine projections at new properties tailored to take full advantage of modern machines.

Stripping—Big shovels, up to 70 cu yd, dominate the stripping scene in 1957. New drills make it possible to drill deeper overburden without stem changes. Mechanical tamping machine reduces labor in charging horizontal holes, and new types of ammonium nitrate explosives lead to increased safety and economy.

Preparation—Heavy media and wet tables, including a new double-deck unit, receive increasing acceptance in plant installations and additions.

For Your Information—Complete listing of preparation equipment installations in 1957, by company, capacity and type.

► Mining Development

Trends in Coal Mining Today and Tomorrow p 104

The coal-mining emphasis today and in the immediate future is on larger capacity equipment, the use of continuous machines underground, improved transportation in both deep and strip mining, the beneficiation of the smaller sizes, the recovery and treatment of the fines, and the development of maintenance methods measuring up to the more-costly higher-capacity equipment now employed. The emphasis also is on the development of production standards and cost control

(*Continued on p 7*)

COAL AGE, February 1958, Vol. 63, No. 2. Published on the 1st with additional issue in Mid-July by McGraw-Hill Publishing Co., Inc. Publication office, Third & Hunting Park Ave., Philadelphia 40, Pa. United States subscription rate for individuals in the field of the publication $3 per year; single copies $1. Second class mailing privileges authorized at Philadelphia, Pa. For additional information see p. 11.
Postmaster: Please send Form 3579 to Coal Age, 330 W. 42nd St., New York 36, N.Y.

IN TODAY'S LIGHT FOR THE MINER—

The dollar you pay for **performance** *buys an outstanding value with* **WHEAT**

When you install WHEAT Electric Cap Lamps you get *continuous, high-level lamp performance.* Year after year, WHEAT gives you more light, dependable light, with less maintenance and at lower cost.

Development of the WHEAT all-metal Automatic Charging Rack with its electronically-controlled, selenium-disc rectification makes possible further savings through fully automatic operation.

Why not investigate!

National Mine Service Company

HAS THE FACILITIES —DELIVERS THE GOODS

564 ALCOA BUILDING, PITTSBURGH 19, PA.

9 DIVISIONS TO SERVE YOU

ALL-STATE DIVISION, Logan, W. Va. • ANTHRACITE DIVISION, Forty Fort, Pa.
ASHLAND DIVISION, Ashland, Ky. • BEMECO DIVISION, Beckley, W. Va. • CLARKSON DIVISION, Nashville, Ill.
KENTUCKY-VIRGINIA DIVISION, Jenkins, Ky. • MOUNTAINEER DIVISION, Morgantown, West Va.
WESTERN KENTUCKY DIVISION, Madisonville, Ky. • WHITEMAN DIVISION, Indiana, Pa. Morgantown, W. Va.

systems designed to insure the maximum return from the new producing facilities, as well as increasing the skills of operating management, supervisors, and men.

Ahead for Tomorrow—A wide range of new development ranging from large-scale use of remotely controlled miners to blow charging of shotholes in strip mining.

► Safety, Equipment Sales

Safety in 1957 ..... p 110

1957 Sales of Mining Equipment ..... p 114

W. H. Young, R. L. Anderson, USBM

Fatality totals were up in 1957 over 1956, mainly because of five major disasters. Frequency rates on all accidents, fatal and non-fatal, were down in 1957. Research points the way to new safety gains in the years ahead.

Sales of mining equipment reflect trends toward more continuous mining and mechanical cleaning.

► Belt Haulage, Continuous Mining

Rope Belts Boost Efficiency At Peabody Coal ..... p 124

A. E. Flowers, Associate Editor, *Coal Age*

Faster belt extensions, lower maintenance and supply costs, and greater flexibility in mining are some of the benefits credited to use of rope belts at Peabody. Continuous miners drive rooms 300 ft deep before cutting a breakthrough. Then a conventional unit and extensible rope belt takes 11-ft slab cut from each rib. It takes only three shifts for a 17-man crew to load the two slab cuts containing 2,500 tons of coal. And it is not uncommon for a crew to load 1,000 tons per shift from the slab cut. An 8-man continuous miner crew produces an average of 500 tons per shift in rooms.

► Strip-Mining Cables

More From Portable Cables for Surface Mining ..... p 140

Stephen Bunish, Anaconda Wire & Cable Co., Marion, Ind.

Nationwide survey shows that rock falls and slides, runovers by pit equipment, and dragging cause nearly two-thirds of all cable failures. Other causes include splicing, excessive tension, severe design and faulty components in design. The approach to the problem of good cable maintenance includes wise choice of cable type, maintenance of a record of cable failures, education of operating personnel in cable limitations, and the taking of remedial action based on records.

This Month in COAL

CONTINUED SLOW—January, 1958, brought little change in the slow pace of business in the United States characterizing the last 3 mo of 1957, which in turn brought the bituminous output for the year down to 490 million tons (preliminary estimate), compared to 501 million tons in 1956. The December rate of around 9 million tons a week, fell still more in January, with the average appreciably under 9 million. No appreciable change in this rate is in sight for the month of February.

Warm weather, along with that old villain, oil, and the relative newcomer out for the blood of both, natural gas, kept the anthracite rate under ½ million a week in the last quarter of 1957, with the result that total output fell to 25.5 million tons, compared to 28.9 million in 1956. Anthracite degree-day watchers found some comfort in the January figures however. If the more seasonable temperatures should continue through February and March the industry would have a good start on a good year for production and sales, both 1958 and 1959.

UPTURN WHEN?—To get back to the 1956 level of output, which level, or even slightly more, as indicated in the review section of this issue, is still possible, the bituminous industry needs to operate the remainder of the year at better than 10 million tons a week. Will it? A few major companies think not, and some, as a matter of fact, expect declines in their own tonnages of up to 5% in 1957. A larger group, however, expects output to be up in 1958—some substantially.

To back up increases, these companies and the industry must have an assist from consumers, particularly steel and general industry. The forecasts, including that of the McGraw-Hill Dept. of Economics (see review section), are for such an upturn, though the timing and magnitude are still a matter of debate. The consensus is that it will occur about the middle of the year and that it will be moderate. On this basis, coal could expect a better-than-57 year. If the rebound was of some magnitude, the industry might equal or better the 501 million tons of 1956.

OIL AND GAS—A less happy New Year than customary also was the lot of oil and natural gas, which went into February at a slower pace than in 1957. The Memphis decision requiring operators to get the consent of customers before imposing rate increases was a stunning blow to the natural-gas pipe lines. Until the situation is finally clarified—in the Supreme Court or Congress—the drive to build new lines and push through more gas will have a lot less steam behind it.

In oil, the administration continues its drive to reduce the volume of imports. This drive was stepped up in December when the West Coast was added to the area covered by the restrictions. The ultimate effects are still to be determined, but the pressure is being kept on and consequently a new era of heavy dumping is being held off.

The net of the interaction of these and other forces probably can be summed up in these words: No major change in the competitive picture in 1958, and especially no increase in the pressure on coal.

Can I reduce my inventory of bearing greases to one?

YES. Use Texaco Multifak. It's the one bearing grease that is equally effective for all grease-lubricated, high speed, anti-friction bearings—above or below ground. How so?

Texaco Multifak is designed as the all-purpose bearing lubricant. It pumps easily at low temperatures. It withstands moisture and prevents wear and rust through a wide range of operating temperatures. It has a high resistance to oxidation.

Texaco Multifak can improve your lubrication set-up 4 ways: It can cut inventories, reduce the chance of lubrication error, save servicing make-up . . . all without sacrificing one iota of full bearing protection.

For wire rope or open gears . . . Your Texaco

representative will include Texaco Crater—or for spray application, Crater X Fluid—in your Simplified Lubrication Plan. Crater keeps cables strong longer and open gears running smoothly.

There are many ways to reduce lubricant inventories. A Texaco representative can sum them up in one of Texaco's famous Simplified Lubrication Plans, put together especially for your mine. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TUNE IN...Metropolitan Opera Radio Broadcasts Every Saturday Afternoon

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

HERE'S WHY THOSE WHO KNOW PREFER THE *Lee-Norse* MINER

PATTERN CUTTING—*only Lee-Norse has it.*

CUTS MORE COAL WITH LESS POWER . . . *cutters revolve and oscillate at the same time—milling the coal from the face.*

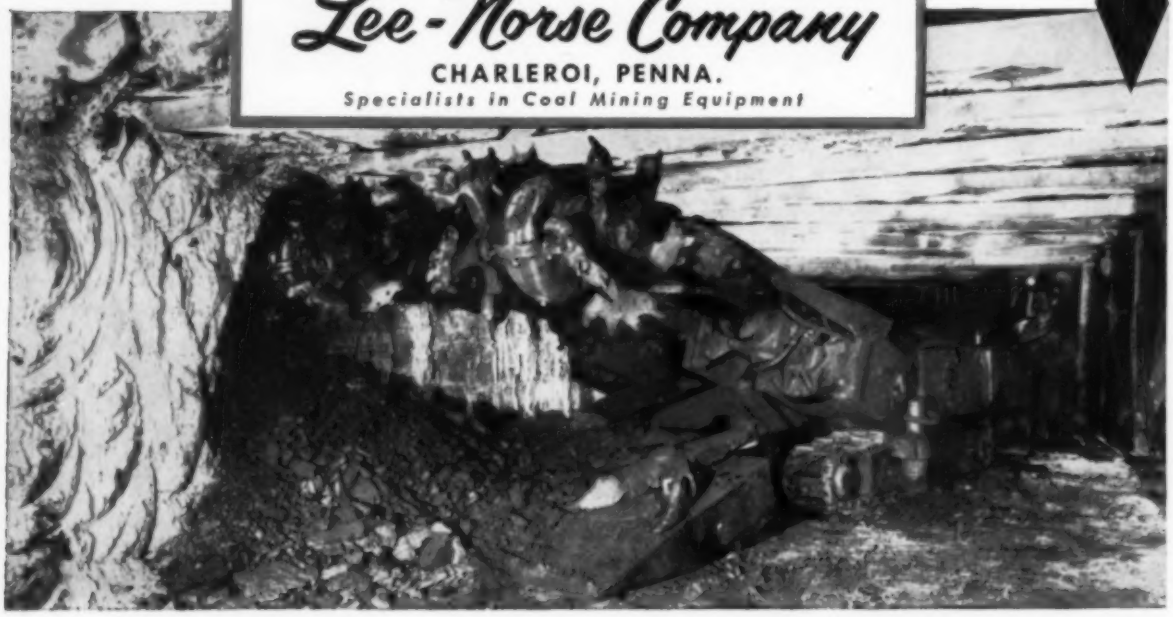
CUTS A COARSE PRODUCT—FEWER FINES . . . *cutter bits follow a right and left spiral direction producing a diamond pattern which breaks off in coarse cuttings.*

A SIMPLE, STURDY MACHINE . . . *essentially a modern loading machine on which is mounted a set of efficient cutting heads.*

HIGHLY MANEUVERABLE—FAST TRAMMING. . . *not a "muscle-bound giant" . . . it quickly follows any variation in seam thickness.*

EXCELLENT CLEAN-UP . . . *improved dual gathering arms load all the coal into a flexible rear conveyor.*

Lee-Norse Company
CHARLEROI, PENNA.
Specialists in Coal Mining Equipment



Strip Mining

Ripping Coal for Loading ..... p 148

Raymond F. Mueller, Caterpillar Tractor Co.

Rippers mounted on big crawler tractors cut cost of breaking coal materially and tend to reduce the output of fines. Examples of savings include: 6.3-ft seam, $27,000 a year; 4½-ft seam, $42,000 a year.

Sidelights—Ripping patterns; collateral benefits.

Dust Elimination

Tipple Dust Control ..... p 154

A. S. J. Hopkins, Vice President Engineering, Amherst Coal Co., Lundale, W. Va.

Search for a low-cost method of keeping down dust in handling a very-dry coal resulted in installation of sprays at bin discharge, scalping shaker and refuse crusher. A chemical additive reduces the surface tension of the water and greatly increases its effectiveness. Automatic controls operate sprays only when coal flows. Better community relations supplement reduction of explosion and health hazards.

CARL COASH, Publisher IVAN A. GIVEN, Editor

Harold Davis, Managing Editor; A. E. Flowers, Associate Editor; W. A. Raleigh Jr., Assistant Editor

Daniel Jackson Jr., Assistant Editor; Richard J. Taft, Assistant Editor; F. A. Zimmerli, Art Director

G. B. Bryant Jr., Washington; W. H. McNeal, Circulation Manager; Raymond H. Smalley, Business Manager

D. C. McGRAW JR., Advertising Sales Manager

Member of Associated Business Publications and Audit Bureau of Circulations

NEWS BUREAU OFFICES: Atlanta 3; Cleveland 15; Detroit 26; Houston 25; San Francisco 4; Washington 4.

WORLD NEWS OFFICES London, Paris, Bonn, Tokyo, Bombay, Rio de Janeiro, Mexico City.

COAL AGE, VOLUME 62 February, 1958, NUMBER 2

COAL AGE, with which are consolidated **The Colliery Engineer** and **Mines and Minerals**, is published monthly on the 1st with an additional Mining Guidebook number in Mid-July by McGraw-Hill Publishing Co., Inc., James H. McGraw (1860-1948) Founder. PUBLICATION OFFICE, Third & Hunting Park Ave., Philadelphia 40, Pa. See box below for directions regarding subscriptions and change of address.

EXECUTIVE, EDITORIAL, CIRCULATION and ADVERTISING OFFICES, 330 West 42d St., New York 36, N. Y. Donald C. McGraw, president; Joseph A. Geradi, executive vice president; L. Keith Goodrich, vice president and treasurer; John J. Cooke, secretary; Nelson Bond, executive vice president, Publications Division; Ralph B. Smith, vice president and editorial director; Joseph H. Allen, vice president and director of advertising sales; A. R. Venezian, vice president and circulation coordinator.

Subscriptions are solicited only from executives, management, engineering, operating and supervisory officials associated with companies engaged in the mining and preparation of anthracite, bituminous and lignite coal. Position and company connection must be indicated on the subscription orders. Send to address shown in the box below.

U. S. and possessions and Canada, subscription rate for individuals in the field of the publication $3 per year, single copies $1; elsewhere $15 per year, payable in advance. Single copies $2. Second-class mail privileges authorized at Philadelphia, Pa. Printed in the U. S. A. Title registered in U. S. Patent Office. © Copyrighted 1957 McGraw-Hill Publishing Co., Inc. All rights reserved. **COAL AGE** articles are indexed by Engineering Index. **Coal Age**'s own index is published annually in the December issue.

SUBSCRIPTIONS: Send subscription correspondence and change of address to Subscription Manager, COAL AGE, 330 West 42nd St., New York 36, N. Y. Subscribers should notify publisher promptly of any change of address, giving old as well as new address and including postal zone number, if any. If possible, enclose an address label from a recent issue of the magazine. Please allow one month for change to become effective.

This Month in Mining Practice

MORE WATER?—Either mining conditions are changing or more water is coming down from the skies if field comments on mining problems of the day can be considered a guide. Or perhaps water—underground, that is—comes in waves. Between the two World Wars a great deal of time and thought was devoted to water and it was an era of major advance. Then the problem apparently lessened in bituminous while increasing in anthracite. Now water seems to be flooding up again in bituminous deep mines, bringing with it the problem of how to handle it—and the further problem of how to handle it to minimize stream pollution.

MORE CIRCUITRY—Study of the preparation-contract summaries over the past few years, including those in the review section of this issue, show that the problem of preparation water—either getting an assured supply or, more frequently, getting it out of the coal and cleaning it up to prevent pollution—is also a growing one. A special water circuit will be found in an increasing number of plants.

MORE PROBLEMS—Water in its various applications is, however, only one of the problems mining men list as causing them the most head-scratching today. There are at least six other major ones in deep mining, the same in strip mining, and twelve in the service and general categories common to both. They are:

Deep Mining:

1. Selecting new equipment.
2. Improving the mining plan.
3. Improving pillaring methods.
4. Improving the face cycle.
5. Preventing roof trouble.
6. Getting good ventilation.

Strip Mining:

1. Selecting new equipment.
2. Raising drilling results.
3. Improving blasting.
4. Preventing equipment abuse.
5. Stripping deeper overburden.
6. Improving coal loading.

Service and General:

1. Preventing machine breakdowns.
2. Improving repair service.
3. Preventing supply waste.
4. Preventing equipmnt abuse.
5. Fine-coal cleaning and drying.
6. Water handling and clarification.
7. Promoting safety.
8. Training supervisors, managers.
9. Training mechanics, electricians.
10. Training machine operators.
11. Reducing complaints and grievances.
12. Getting good discipline.

The list definitely indicates a challenging year for coal men.

The Coal Commentator

Reappraisal

A really safe prediction for the future is that the output of coal from continuous miners will continue to rise. The number of units sold in 1957 is some of the evidence that such equipment is here to stay. Another bit is the fact that the machines are now coming in an increasing number of types, including a new Canadian-developed version of the borer (January *Coal Age* p 122).

The inventive genius of manufacturing and mining men undoubtedly will be reflected in additional types—and in gains in the fields of problems growing out of the use of continuous equipment. One is the high rate of methane and dust liberation at the face—the precise spot where sparks with the ability to ignite gas are being produced. The existence of these conditions is forcing a reappraisal of the safety-code ban on fans and blowers underground.

If the reappraisal could be extended to include the ban on diesels, two most worthwhile objectives could be attained at one and the same time.

Best Wishes

The first-of-the-year news budget is always characterized by a jump in the number of announcements of promotions and retirements—and Jan. 1, 1958, was no exception. **Among others, it brought word of the retirements of Dr. M. Edmund Speare, NCA educational director; H. J. (Mandy) Mandeville, press representative, Coal Div., Eastern Gas & Fuel Associates; and Raymond Mancha, ventilation vice president, Joy Mfg. Co.**

All three were outstanding in their respective spheres, and join the company of those who have made notable contribution to the advancement of the coal-mining industry over long periods of time. They take with them hearty thanks for these contributions—and best wishes for a pleasant and rewarding future.

By Air Too?

If coal can be moved from mines to power plants in water in pipelines, why not by air too? A satisfactory answer to that question, according to some who have studied it, involves pulverization to burning size before the coal goes into the line. This, it is contended, is now feasible, using new techniques. Aside from arriving in the right size for firing, air transport also would eliminate the drying problem.

Air hoisting and transport of coarse coal is being done experimentally abroad, and fine coal has been so transported in power plants in the United States. **Perhaps the U. S. can pioneer the long-distance transport of fine coal and other solids by air in pipelines.**

Helfer der Menschheit

Meaning "Helpers of Mankind," these words appear on four special stamps honoring West German coal miners—and incidentally, through a surcharge, contributing to their welfare fund.

It is good reason to comment once again on the lack of a stamp honoring coal mining and coal miners in the United States. The fact that efforts to convince the proper authorities of the merits of such a stamp have so far met with failure perhaps reflects the difference in how the public looks on coal in the United States and abroad. Elsewhere it is almost universally valued in line with its true worth, witness "Helfer der Menschheit," for example.

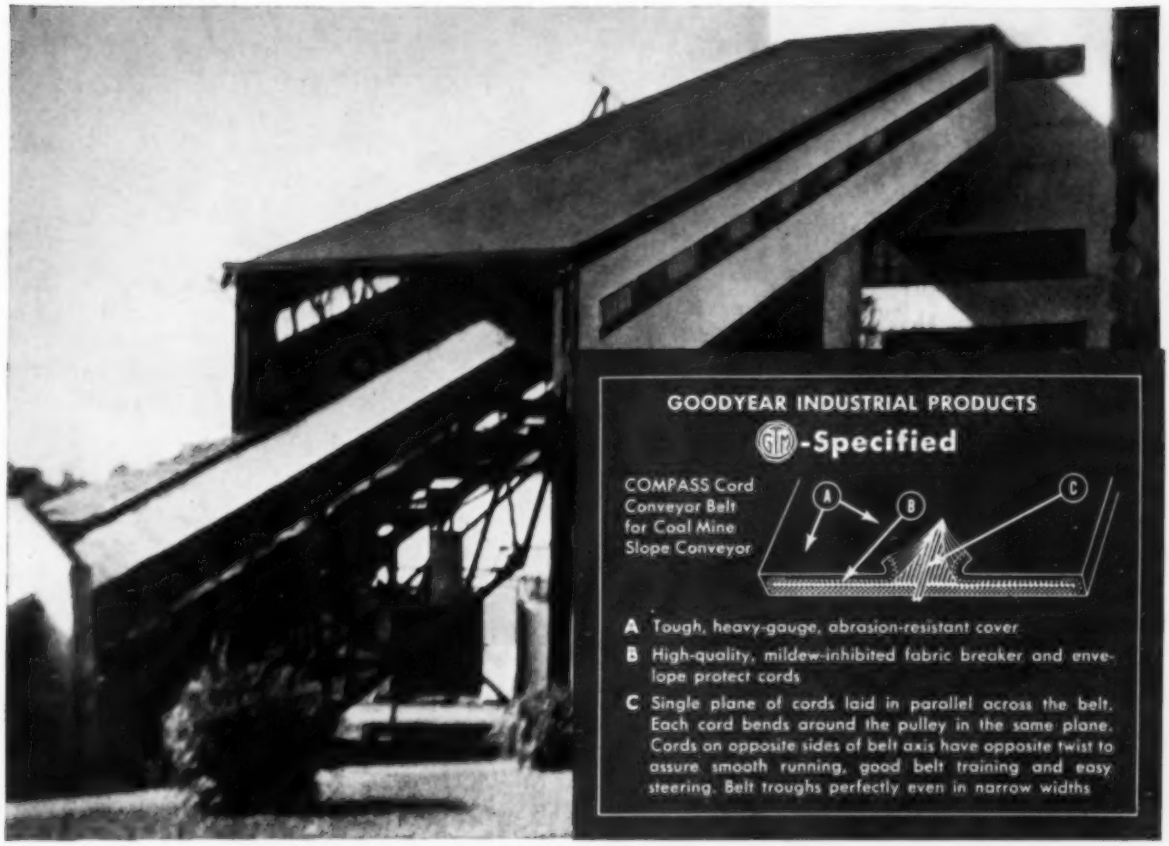
The contributions of the coal miners of the U. S. are no less than those of Germany—and they are no less worthy of a stamp. Moral? The industry and its friends should keep pressing until a stamp is authorized.

New Drive

An electric-utility market of at least 292 million tons in 1965 now appears to be the solid minimum. And, as Bill Raleigh points out in his study of the outlook elsewhere in this issue, it could go to 323 million if coal's share of the market could be raised only modestly from its present 70 to 77½%.

How solid is this expectation? Can the forecast be upset by oil, natural gas or that newcomer, nuclear power? It becomes more and more apparent that none of the three can do it on the basis of a realistic competitive price. Coal has kept its price down, and has a good opportunity to continue keeping it down for sometime to come. Oil and gas cannot, and the nuclear newcomer so far comes out third in rank of possibilities, since the best future estimate of nuclear-based juice is 10 to 12 mills per kilowatt-hour, against 65 mills for Shippingport and less than 10 mills for the average coal-fired plant, down to 5 mills for the latest mine-mouth operations.

The big hazard from the atom is in subsidized plants. The drive will have more steam behind it in this session of Congress, with public-power advocates leading the pack. Coal should set its sights accordingly.


GOODYEAR INDUSTRIAL PRODUCTS
GM-Specified
COMPASS Cord Conveyor Belt for Coal Mine Slope Conveyor
A
B
C
A Tough, heavy-gauge, abrasion-resistant cover.
B High-quality, mildew-inhibited fabric breaker and envelope protect cords.
C Single plane of cords laid in parallel across the belt. Each cord bends around the pulley in the same plane. Cords on opposite sides of belt axis have opposite twist to assure smooth running, good belt training and easy steering. Belt troughs perfectly even in narrow widths.

Serves over 12 years, sells 2 more belts

They were asking a lot of any belt when the slope conveyor was installed at this Kentucky coal mine. For, in addition to the usual load, abrasion and threat of mildew, the climb was a tough 16° and over 1000 feet long.

But the G.T.M.—Goodyear Technical Man—was confident when his designed-to-the-job belt was placed on the drive. He felt certain its high strength, mildew-inhibited construction could take the long pull in stride. And it did!

Despite overloads of as much as 150% for long periods, the G.T.M.'s belt, at last report, had *served over 12 years—looked good for years more.* And so well did it serve that its operators have since purchased two Goodyear belts of similar construction for other mines.

What about your belting problem? No matter what the operation—or how tough it might be—the G.T.M.'s your man. He's always within easy reach, too—either through your Goodyear Distributor or by writing:

Goodyear, Industrial Products Division
Akron 16, Ohio

CONVEYOR BELTS by

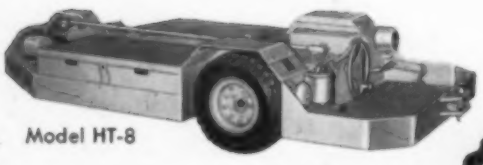
GOODYEAR

THE GREATEST NAME IN RUBBER

Compass—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

KERSEY keeps Coal Moving

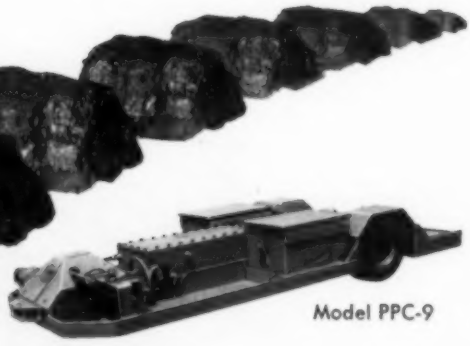


Model HT-8

EASIER

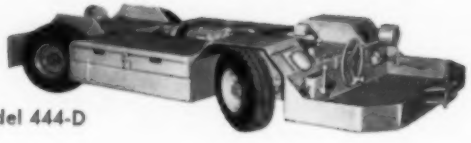
FASTER

at LESS COST



Model PPC-9

Rail Locomotive



Model 444-D

NOW - Safe with Permissible Equipment

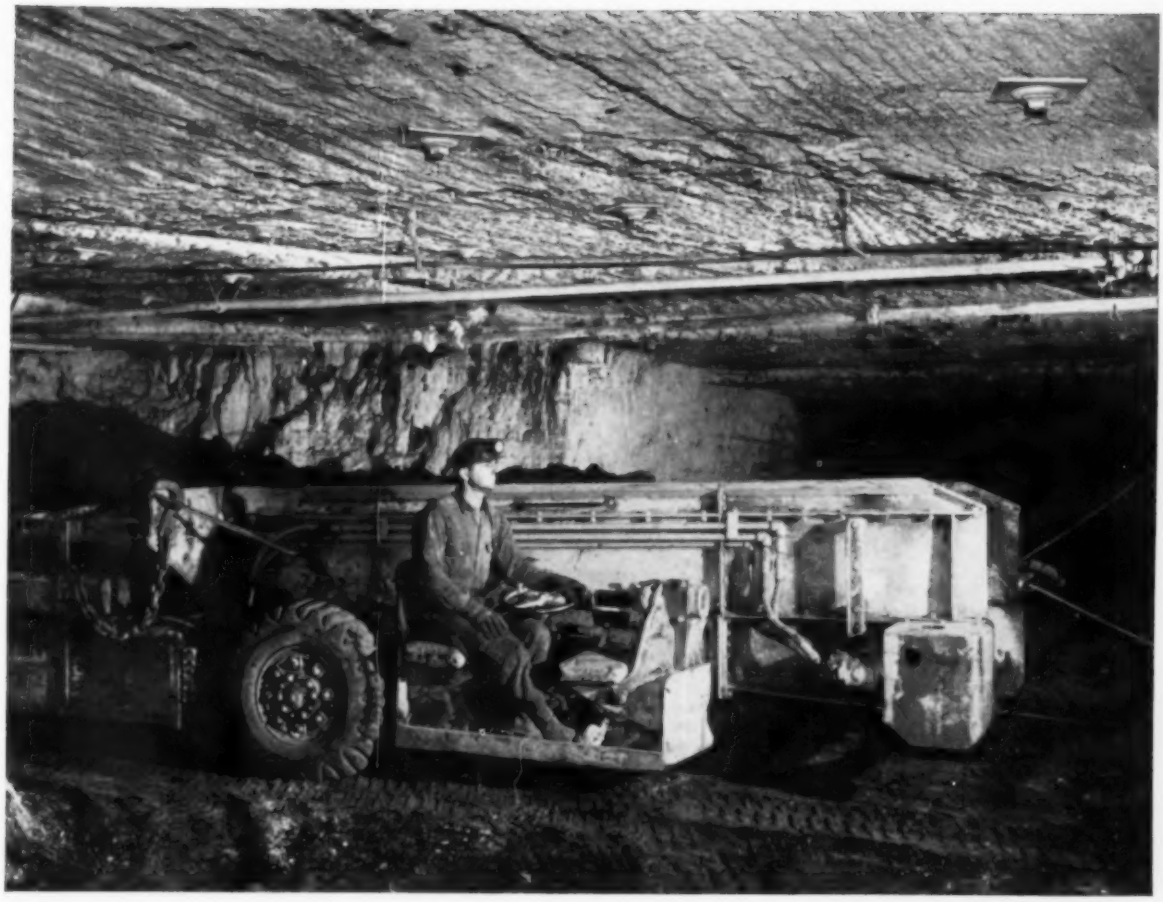
Kersey celebrates its decade of designing and building the best in battery-powered tractor and rail-locomotive equipment for the coal industry by now adding permissibility in emergency vehicles, utility, supply and personnel tractor equipment.

Approved by The U. S. Bureau of Mines (Acceptance No. 2-1285) Permissible, Explosion-Proof Units are Kersey's answer to the increasing need for coal and better ways to mine it.

If you want to see Kersey Mine Haulage Equipment in operation — ask us for the name of the nearest operator to your mine.

KERSEY
MANUFACTURING CO. INC.
BLUEFIELD, VIRGINIA

WHEN YOU WANT
MODERN EQUIPMENT
FOR MODERN HAULAGE
AND WANT THE BEST—
CHECK WITH KERSEY FIRST!



How to bolt your roof...quickly

You can anchor your roof in jig time when you use Bethlehem square-head roof bolts equipped with expansion shells. Simply use your regular drilling equipment and an impact wrench.

Besides saving time, roof bolting does so much to promote safety by locking the overlying rock layers in place. With heavy timbers no longer taking up so much room, it's easier to move mechanized equipment. Ventilation is improved and fire hazards are reduced. And there's less need for large storage areas, both above and below ground.

The Bethlehem square-head roof bolt is used with a leaf-type malleable-iron shell, which is fastened to the leading end of the bolt. As the bolt is tightened in the hole, the leaves of the shell expand, locking the assembly in place. A square roof plate furnishes additional support. A hardened washer reduces friction which may occur between the bolt head and roof plate.

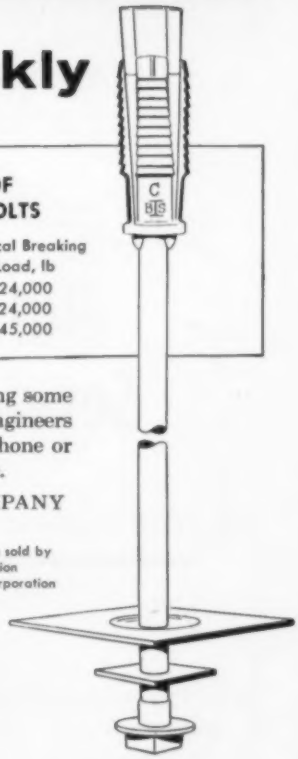
THREE TYPES OF SQUARE-HEAD BOLTS

Type	Diam. In.	Typical Breaking Load, lb
Carbon	¾	24,000
High-Strength	⅝	24,000
High-Strength	⅞	45,000

If you're thinking about doing some roof bolting, let one of our engineers give you full details. Just phone or write our nearest sales office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation



BETHLEHEM STEEL

BETHLEHEM STEEL

SCANDURA

Gold Line for Coal Mining

Tough • Strong • Fire Resistant

"THE BEST OF THEM ALL"

Acceptance designation "Fire-Resistant, U.S.B.M. No. 28-1" has been assigned to this belt.

More and more mines are using and reordering SCANDURA because:

Exclusive Distributors for the Mining Industry East of the Mississippi

National Mine Service Company

GOLD LINE is completely Fire-Resistant

GOLD LINE uses mildew inhibitors and rot proof Nylon to assure *double* mildew and moisture protection

GOLD LINE resists abrasion and cover stripping better than conventional belting

GOLD LINE easily absorbs shock loads and impacts

GOLD LINE has a tensile strength substantially higher than conventional five ply belts.

Suite 564, Alcoa Building, Pittsburgh 19, Pa.

All-State Div., Logan, W. Va. • Whiteman Div., Indiana, Pa. Morgantown, W. Va. • Ky.-Va. Div., Jenkins, Ky. • Western Ky. Div., Madisonville, Ky. • Ashland Div., Ashland, Ky. Anthracite Div., Forty Fort, Pa. • Bemeco Div., Beckley, W. Va. Clarkson Div., Nashville, Ill.

SCANDINAVIA BELTING COMPANY,
Newark 1, N. J. PLANT: Charlotte, N. C.

No matter how it's said . . .

by smoke . . . by drum . . . by phone . . .

There's only one final and revealing conclusion:

A FAIRMONT-DESIGNED -BUILT PREPARATION PLANT *Satisfies*

Smoke signal, drum talk or word-of-mouth—news about the high performance of Fairmont preparation plants gets around the industry quickly.

Talk with any operator of a Fairmont cleaning plant and you will find him enthusiastic and "completely sold." He will tell you about the uniformity of *his product* and how his FAIRMONT-erected plant has better than 99% separating efficiency through a size range of from ⅛" to 10" in any tonnage capacity. You soon note his satisfaction hinges on his cleaner and upgraded coal—his increased sales—his improved profits. All due, as he will frankly tell you, to his modern, well-planned Fairmont installation.

Look into the Fairmont story—send us a signal and we'll be there pronto!

FAIRMONT MACHINERY COMPANY

FAIRMONT, W. VA.

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.

See how they work that

At this giant strip mine, the Tiger Brand Amerclad (shown in foreground below) is tortured by being dragged over razor-sharp rock and constantly pelted by flying fragments that are being blasted. It lies in the sun, rain and snow during the 24-hour workday.

Tiger Brand Amerclad

In wet or dry locations!

VERY FRANKLY, we do not make a range of Tiger Brand Amerclad qualities. When you see the Tiger Brand Amerclad mold identification on a length of portable cord or cable, you can be quite sure that nothing better can be purchased, no matter how much you want to spend for it.

The reason is that American Steel & Wire has catered strictly to the *heavy-duty* market where portable cord or cable is concerned. We're well aware that cable failure can be one of the most exasperating production difficulties that you can encounter. Expensive too, because nothing operates without power.

So the greatest care is lavished on Amerclad. Every inch of cable is vulcanized in a freshly cast lead sheath to insure a dense, tough, homogeneous sheath. Mechanical skimmers remove dross from the lead-melting pots, and the pots themselves are kept in an inert gas atmosphere to prevent formation of impurities.

The result is an amazingly tough and durable cable with precisely centered conductors that withstands mechanical abuse, water, oil, grease, gasoline, ozone, heat and cold. Ask your AS&W salesman for the story . . . and a catalog.

AMERICAN STEEL & WIRE DIVISION
United States Steel, General Offices: Cleveland, O.
Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, New York

The workman is holding an electric concrete tamper that knocks the entrapped air out of the mix before it sets—giving a denser, stronger concrete. The tamper is equipped with Tiger Brand Amerclad. It's dragged through wet concrete, over piling and beams, run over by trucks. Yet the manufacturer says he has never had a complaint about the cable.

Watch the **United States Steel Hour** on TV every other Wednesday (10 p.m. Eastern time).

USS TIGER BRAND ELECTRICAL WIRE & CABLE

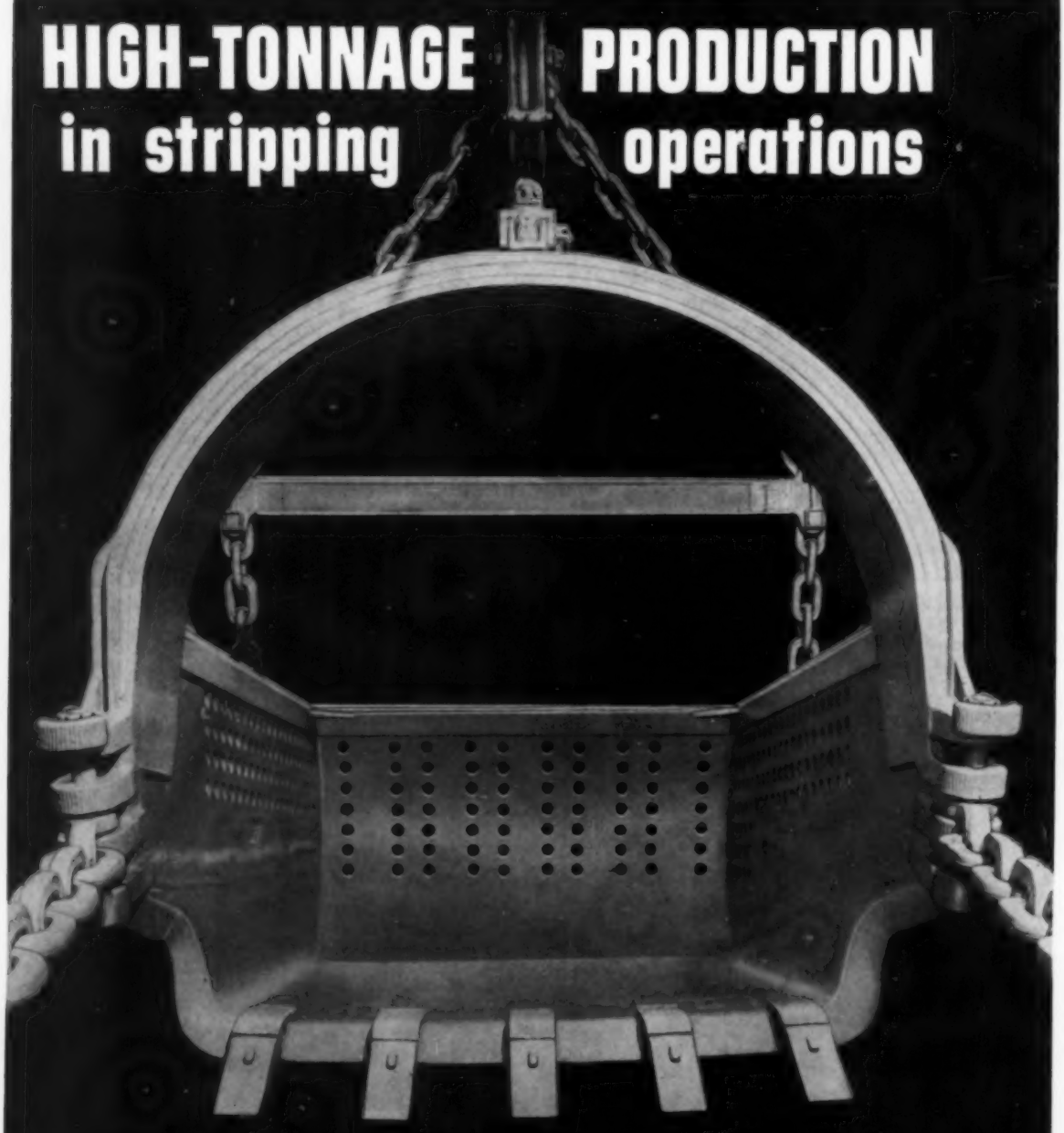
a standard Tiger Brand cable for every special job

- Asbestos Wire and Cable
- Mold Cured Portable Cord
- Shovel & Dredge Cable
- Paper & Lead Cable
- Varnished Cambric Cable
- Interlocked Armor Cable
- Special Purpose Wire & Cable
- Aerial, Underground and Submarine Cable

UNITED STATES STEEL

USS TRADEMARK

HIGH-TONNAGE PRODUCTION in stripping operations



HENDRIX
Heavy Duty **Mining Buckets**

- HIGHER ARCH
- GREATER WIDTH
- TAPERED BASKET
- ARCHED LIP
- GREATER STRENGTH

4½ to 14 Cubic Yards With or Without Perforations

HENDRIX MANUFACTURING CO., Inc.
MANSFIELD, LOUISIANA

REDUCE THE MOISTURE CONTENT

of Your Coal

from 35%

to 7%

to 6%

to 5%

Yes, even less

Remarkable performance records over the years prove that C.M.I. continuous centrifugal dryers cannot be beat.

C.M.I. Dryers not only reduce surface moisture content from 35% to *less than 5%*, but also will do a fine job in recovering coal from slurry.

Yes, C.M.I. Coal Dryers and efficient coal mining operations go together. Our engineers are available to render prompt service, whenever and wherever needed.

Write, wire or phone for complete details. No obligation.

with **C·M·I** CONTINUOUS CENTRIFUGAL coal dryers

C·M·I *Centrifugal* DRYERS

CENTRIFUGAL & MECHANICAL INDUSTRIES, INC.

146 PRESIDENT STREET • SAINT LOUIS 18, MISSOURI

NOW... THE JOY

STRAIGHT TRAMMING . . . CLEAN BOTTOM

Smooth hydraulic tramming controlled by flow divider distributes power evenly to wide, self-cleaning treads for precise control of straight tramming and turning. Lower trim chain leaves smooth, wide bottom.

EXCELLENT FACE PATTERN . . . GOOD ROOF

Notice how the boring arms and trim chains *break* coal from the face for good size consist. Arched sides and smooth trimming of roof gives good roof control.

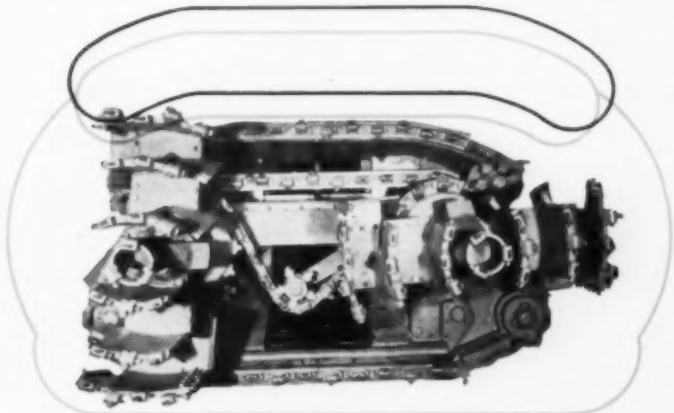
TWIN BORING MINER

advances 2 feet per minute in a 7 foot seam . . . mines 8 tons per minute

EXTREMELY FLEXIBLE

There are two separate trim chains. The photograph shows the machine in the fully contracted position used for tramming. The orange line indicates the expanded position used for mining. The black line shows how the top trim chain may be raised or lowered 12 inches *while mining* for instantaneous control of cutting height to follow any seam.

Two sets of mechanically adjusted boring arms provide boring diameters of 72″, 76″, 80″ and 84″. Thus the one machine can be adjusted to meet several mining heights.



WSW CL 6727-107

Here's the Joy full-face continuous miner that does *any* job underground—development work, driving entries, headings, mining rooms and extracting pillars. This versatility is combined with a very high mining rate.

The rate of advance of a full face miner is largely dependent on the weight of the machine and the power driving it. The Joy Twin Borer weighs 40 tons and has a total of 260 horsepower. This weight and horsepower is supported on wide treads so that ground pressure is kept at a low 23 psi. Result . . . unequalled advance through the most difficult seams.

EXTREMELY VERSATILE—Boring pattern is easily changed from 6 ft. to 8 ft. high—from 12 ft. to 13 ft. wide or two other sizes in between. The top cutter chain can be moved 12″ up or down *while mining* to follow undulating seams or changing seam thicknesses.

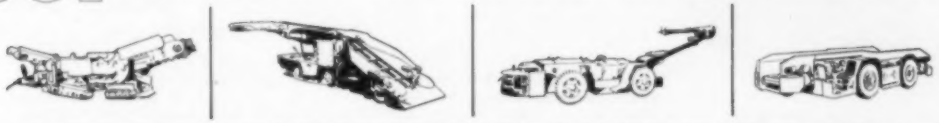
SIMPLE MAINTENANCE—All gear cases, transmissions and electrical controls are mounted on the *outside* of the machine frame. All clutches are the protective slip type.

THESE ADVANTAGES add up to high tons per man and low cost per ton, shift after shift. Talk to a Joy engineer about putting a Joy Twin Borer to work for you. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

See data on other Joy products in this issue

WRITE FOR BULLETIN 187-1

JOY EQUIPMENT FOR MINING...FOR ALL INDUSTRY



CONTINUOUS MINERS, MOBILE LOADERS, SHUTTLE CARS, COAL CUTTERS, CUTTING MACHINE TRUCKS, COAL DRILLS, CONVEYORS, TIMBER SETTERS, SHUTTLE CAR ELEVATORS, BELT FEEDERS, FANS, BITS, PORTABLE BLOWERS, COMPRESSORS ROCK DRILLS, HOISTS, CORE DRILLS

In rotary drilling, pulling a 100-ton, two-mile string of drill pipe subjects the drilling line to the terrific stresses imposed by fast acceleration, shock loads, bending and overwinding on drums. Only wire rope with the highest degree of quality in hardness, strength and fatigue resistance can be used, for toolpushers know that . . .

A quality rope is a safe rope

Whether you use wire rope in the field or in a factory, *safety is just as important to you.* When you buy "bargain" rope you bargain with safety. It can cost you more than the pennies you save. Buy on the basis of *quality*—buy Wickwire Rope.

For extra strength—buy Wickwire's Double Gray IWRC extra improved plow steel wire rope

WICKWIRE ROPE
A CF&I PRODUCT

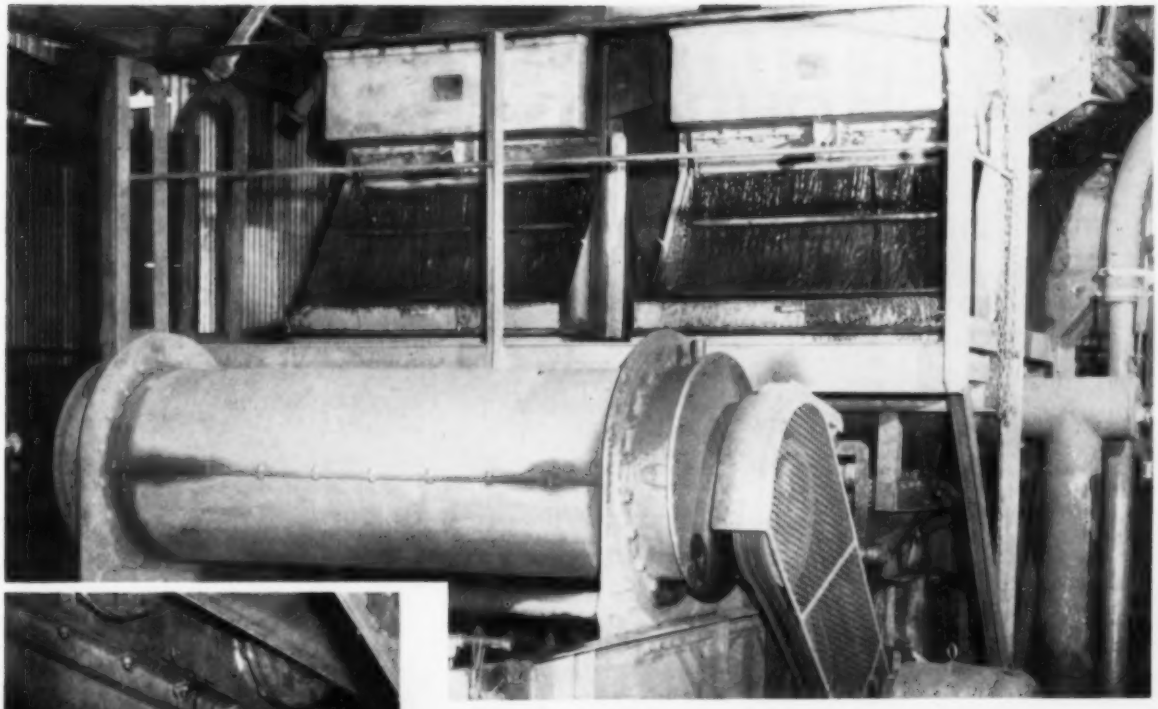
CF&I

LOOK FOR THE YELLOW TRIANGLE

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso Farmington (N. M.) • Fort Worth • Houston • Kansas City • Lincoln (Neb.) • Odessa (Tex.) • Oklahoma City • Phoenix • Pueblo Salt Lake City • Tulsa • Wichita • **PACIFIC COAST DIVISION**—Los Angeles • Oakland • Portland • San Francisco • San Leandro Seattle • Spokane • **WICKWIRE SPENCER STEEL DIVISION**—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) New Orleans • New York • Philadelphia

5736



Rear view of unit, note total utilization of entire screen area.

magnetite medium losses reduced in heavy media cyclone plant on Mesabi Range with

DORR-OLIVER DSM SCREEN

One of the most serious operating problems in the beneficiation of low grade iron ore in heavy media cyclone plants is high magnetite medium losses and difficulties in maintaining a clean medium free of non-magnetics.

At the Mesaba-Cliffs Mining Company's Holman Concentrator at Taconite, Minnesota, the Dorr-Oliver DSM Screens applied to screening of magnetite from cyclone underflow concentrate and overflow tails have consistently reduced the amount of medium sent to the cleaning circuit by 30 to 50% and reduced medium losses thereby approximately 20%.

Key to the marked superiority of the DSM Screen over conventional screening methods is the non-blinding wedge bar screen, fabricated to tolerances of ±.0015 inches; profile design is such to provide maximum screen life. Capacity of the 4′ wide units installed at Holman Concentrator is 75-100 gpm per ft. of screen width when handling minus 8 mesh to 0 material at 70% solids.

For complete information on this newest tool for the mining industries, write for a copy of Bulletin No. 2300. Dorr-Oliver Incorporated, Stamford, Connecticut.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH · ENGINEERING · EQUIPMENT
STAMFORD · CONNECTICUT · U.S.A.

COAL AGE

News Roundup

Nuclear Plant Boom

Atomic Energy Commission plan stirs up interest in research and construction on nuclear plants.

Plans for two nuclear power plants are under consideration by the AEC and word has it that designs for other systems are under way in various parts of the country. Under its Power Demonstration Reactor Program the AEC has extended an offer of assistance to companies contemplating construction of nuclear power plants. Pennsylvania Power & Light Co. and Westinghouse Electric Corp. have filed their joint proposal for a system utilizing a homogeneous type of reactor with a theoretical capacity of from 70,000 to 150,000 kw. It would operate on the thorium-uranium cycle. With the aid of the AEC in further research and development, completion may be possible by 1963, according to the firms.

Another plan for a nuclear power plant of advanced design has been submitted by the East Central Nuclear Group and the newly formed Florida West Coast Nuclear Group. The arrangement includes design, development, construction and operation of a high-temperature, gas-cooled, heavy water-moderated, pressure-tube reactor of 50,000 kw capacity. The estimated completion date for the plant is around 1962. A short time ago the AEC and the Duquesne Light Co. announced that electric power was generated on a test basis for the first time at Shippingport, Pa., site of the world's first full-scale atomic electric power plant devoted exclusively to peacetime uses. The plant has produced 12,100 kw and is expected to have an electrical capacity of 60,000 kw. It is the fifth plant delivering civilian atomic power in the United States. Their economy is still to be proven.

In This Section

People in Coal	p 32
Coal Abroad	p 44
New Books	p 50
Preparation Facilities	p 52
Mines and Companies	p 56
Accidents	p 61
Utilization	p 61
Labor and Coal	p 64
Current Coal Patents	p 68

West Virginia Mining Law Revision

Bill introduced to state legislature would modernize state's mining laws, hitting hard on inspection and safety.

A bill that would bring about the modernization of West Virginia's state coal mining laws has been introduced (Jan. 9) in the House of Delegates, the lower chamber of the state legislature. Among other things, the bill proposes career inspectors covered by a civil service system. The proposed legislation was prepared by coal operator representatives and the United Mine Workers. Its 79 pages contain many new statutory sections and subsections and provide drastic revisions of existing laws and deletion of outdated and obsolete portions of the statutes.

Now "Director"—Introduced by Majority Leader Myles, Fayette Democrat, and Minority Leader Seibert, Ohio Republican, as one of the items covered in Governor Underwood's call for the 30-day legislative session, the bill would change the title of State Mine Chief Crawford L. Wilson to Director and increase his annual salary to $10,000. The

In Pursuit of Knowledge

EIGHT ONE-YEAR SCHOLARSHIPS covering tuition and fees at Southern Illinois University, set up by Sahara Coal Co., have been awarded to deserving young students of the educational institute. The coal firm recently provided the scholarship fund of $9,600 for 60 such grants to be given to qualified SIU forestry students. The scholarships will be distributed over a four-year period, 10 being available during the current school year, 20 each in the next two years, and the remaining 10 in the fourth year.

THE PROBLEMS OF MANAGEMENT were the subjects for a series of three workshops recently completed by Pennsylvania State University and attended by management groups of the coal mining industry. The Mineral Industries Extension Services and the Management Training Staff of General Extension collaborated in presenting one workshop for executive management last April, another in November for superintendents and general foremen, and a third, also in November, for first line supervision.

WHYTE STRAND WIRE ROPE

1000 & 1 Macwhyte Wire Ropes serve your equipment the sure, dependable way

WHYTE STRAND by Macwhyte is designed to meet your every requirement. It is PREformed for flexibility, and internally lubricated for outstanding service in any operation. Macwhyte Wire Rope is in stock for immediate delivery. Ask for Catalog G-16 and recommendations for the correct wire rope for your equipment.

MACWHYTE COMPANY
2906 Fourteenth Avenue, Kenosha, Wisconsin
Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel and Plastic Coated Wire Rope, and Wire Rope Assemblies. Special catalogs available.

MILL DEPOTS: **New York 4,** 35 Water St. • **Pittsburgh 36,** 353 Old Curry Hollow Road • **Detroit 3,** 75 Oakman Blvd. • **Chicago 6,** 228 S. Desplaines St. • **St. Paul 14,** 2356 Hampden Ave. • **Ft. Worth 1,** P.O. Box 605 • **Portland 9,** 1603 N.W. 14th Ave. • **Seattle 4,** 87 Holgate St. • **San Francisco 7,** 188 King St. • **Los Angeles 21,** 2035 Sacramento St.

1116

proposal also would tighten the qualifications for the post of mines director and give him authority to employ a deputy director whose salary would be fixed by the department head. Wilson called the bill a "progressive proposal and one of which each person directly or indirectly associated with the coal industry justly can be proud."

Separate Boards-The new legislation would set up a five-member examining board for mine inspectors and a three-member coal mine safety board of review. Serving on both boards as the public representative would be the head of the West Virginia University School of Mines. Mine workers and coal operators would have equal representation on the two boards. Members would be removable only for cause. Named by the governor, subject to confirmation by the State Senate, board members would be paid $40 per diem, plus expenses.

More Experience—Except for the public member, examining board members would be appointed for overlapping terms of eight years. The director of mines would be an ex-officio member and secretary of the examining board. Members of the safety board would serve four-year terms. Requirements for the post of mines director would include at least 15 yr of experience underground in coal mines, at least 10 yr of which would have to be in West Virginia coal mines. Present law calls for at least eight years of experience in working, ventilation and drainage of coal mines, at least two years of which must have been in West Virginia operations. The bill also provides that the number of mining districts into which the department would divide the state would be increased from a present minimum of 25 to a maximum of 43, retaining the present maximum of five mining divisions.

Increase Salaries—The salaries of inspectors would be fixed by the director at between $7,200 and $8,400 per year. This is virtually double the present range of pay. Civil service would provide security in these posts for qualified personnel after the completion of a probationary period. Applicants for appointment as inspectors would be required to pass all written and oral examinations given by the examining board with grades of at least 90 per cent. Persons placed on a register of applicants would have to requalify every three years. Among other features of the bill are a modern method for classification of gassy and other mines; a stronger section dealing with storage, transportation, and use of explosives, and new safety provisions for hoisting or lowering men in shafts.

Legislative Checks—The following points also are covered in the proposed legilsation: legislation of presently accepted methods of roof supports with bolts; adequate restriction from the safety standpoint on the use of alternating current equipment underground; safeguards in the use of continuous-mining machines; control of dust in drilling of roof and/or bottom rock to eliminate an exposure to silicon dust; legal status for use of fire-resistant belts, and additional safeguards for rubber-belt haulage systems.

Safety First—Specific definition in terms of personnel and maintenance in connection with required fire protection devices both underground and on the surface; safety requirements and reporting procedures for auger mining; provisions for bleeder openings or air courses in gassy mines as of the effective date of the new act; stipulations for test holes in advance of working faces to prevent cutting into either impounded water or explosive gas; a prohibition against purchase of transformers filled with flammable liquid for use underground; a provision for an appeal to the director in instances where a coal operator feels he has been mistreated; establishment of a maximum fee for opening a mine to assure that the director has prior knowledge of such action.

THE WORLD'S LARGEST HORSES, the Anheuser-Busch Champion Clydesdales, and the world's largest electric power shovel, Peabody Coal Co.'s "Big Paul," recently compared stature at Peabody's River King mine at Freeburg, Ill., 30 mi southeast of St. Louis. Total weight of the horses and wagon is 10½ tons. "Big Paul," the "King of Spades," can scoop 195 tons in one bite or enough earth to fill two railroad cars.

Glen Alden Loses Tax Appeal

Plea for a $16,000,000 tax assessment cut goes by the boards as present rate is termed fair.

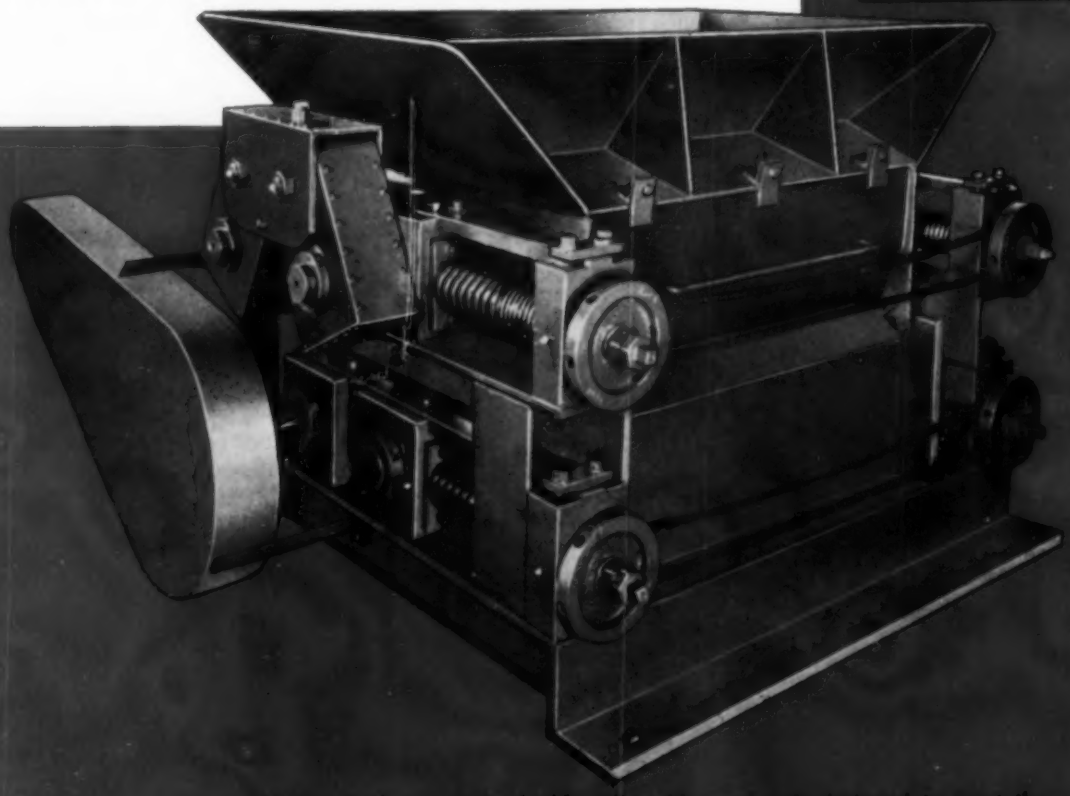
An appeal for a substantial cut in its 1958 coal assessment made by Glen Alden Coal Co. to the County Assessors of Luzerne County has been rejected recently, dimming temporarily at least, the firm's hope that it would be able to get on to better ground in its tax situation. A $1,952,693 reduction that was allowed is but a drop in the bucket to the company and is said to represent normal allowance for coal depletion. The board of county assessors made two principal findings: that the valuation on the company is based on a fair market value at the present time; and that Glen Alden's assessment is uniform with other assessments in the county.

Too great a burden—It was stated that a reduction at this time would place an intolerable burden on the taxpayers of Luzerne County. Going further, the board attributed Glen Alden's ailing situation to factors more weighty than taxation. It said: "Some of these factors are loss of coal markets, increased cost of mining, unfair competition by companies in other areas, which do not conform to state laws, and use of other competitive fuels such as gas and oil." It was thus indicated that the board felt reduction of taxes on coal properties would not solve the real problem.

Conveys land—Appeal by Glen Alden is definitely on its way, according to firm sources. The company has entered into a stipulation with the county, permitting them to consolidate appeals within municipalities. Further, in line with new policies of anthracite companies to lessen tax loads by divesting themselves of properties, Glen Alden has conveyed what it describes as "portions of its surplus coal reserves" to three new

Meet the Press in a
GUNDLACH CRUSHER

Meet the press of today's market where absolute control of top size is essential



The Gundlach two-stage double adjustable crusher is designed to meet the exacting demands of today's market in that it is capable of crushing to any desired top size from ½" to 6". The resultant crushed product is uniform in size, with definite control of top size, and has a smaller percentage of fines than any other crusher on the market.

Primary and secondary crushing in one operation eliminates additional crushing and conveying equipment. Compactness in design saves valuable installation space. Quality controlled production eliminates unwarranted use of horsepower.

Both upper and lower rolls are adjustable by mere turn of hand wheel (even while crusher is in operation), to compensate for variance in size of feed and desired size of end product. Product to be crushed is fed to crusher where the heavy hook-design tooth-studded upper rolls perform the primary crushing operation. Simultaneously the patented pocket-tooth designed lower rolls grab and reduce the pre-crushed product to the desired top size with a minimum of grinding action.

T. J. GUNDLACH MACHINE CO.

DIVISION OF [illegible] INDUSTRIES, INC.

P.O. Box 283 • Belleville, Illinois

corporations. Conveyances of approximately 2,945.48 acres to the newly-organized Bliss Coal Corp., Truesdale Coal Corp., and Loomis Coal Corp., have been announced.

Anthracite Crusade

Attempt to bring home the facts about anthracite values is rolling in high gear.

The anthracite industry is looking for slogans to set the record straight about false impressions being created by competitive fuels and to inform the public about the advantages of hard coal. You have a chance to speak up for anthracite and share in a valuable prize which may be as high as $50. Keep your slogans brief, punchy, and convincing, says the Anthracite Information Bureau, sponsors of the contest. Mail them to Anthracite Information Bureau, 342 Madison Ave., New York 17, N.Y., before March 1, 1958. A couple of slogans already submitted may give you an idea: "Anthracite heat costs less-and we can prove it," or, "Clean, safe anthracite for low-cost heat."

Results forthcoming – Campaigns such as these may be bringing results, figures indicate. According to reports, hand-fired anthracite equipment for home heating is still popular, though there is no sure-way of connecting sales with the campaigning done. Although the nationwide sale of domestic heaters for all types of fuel was down 9½% in 1957, hand-fired anthracite sales strongly resisted the trend, being down only 4 % after a marked up-turn in 1956, according to a survey by the Anthracite Bureau. Major sale areas for these units are in rural communities. This might be attributed to the fact that once a stock of coal is delivered, old man winter can howl and puff all he wants without disturbing a coal user while delivery of other fuels may be curtailed or electricity may fail.

Attempts are being made to inform the public about new, modern, compact types of coal units available today. It is suggested that the market for hand-fired burners will merit close attention in 1958 as growing interest among coal dealers in these streamlined heating units has been noted, says the bureau.

COAL AGE

COAL AGE was founded in 1911 by the Hill Publishing Co. In 1915 COLLIERY ENGINEER, with which MINES AND MINERALS previously had been consolidated, was absorbed by COAL AGE.

In 1917, the Hill Publishing Co. and the McGraw Publishing Co. were consolidated to form the present McGraw-Hill Publishing Co., Inc. COAL AGE became a member of this larger publishing enterprise. On July 1, 1927, the journal was changed from a weekly to a monthly.

During 47 years the editorship has been held successively by Floyd W. Parsons, R. Dawson Hall, C. E. Losher, John M. Carmody, Sydney A. Hale and Ivan A. Given. The editorial staff of COAL AGE presently consists of Ivan A. Given, Harold Davis, A. E. Flowers, W. A. Raleigh Jr., Daniel Jackson Jr. and R. J. Taft.

Coal Show Coming

The Bluefield Coal Show, which will be held next May 21-23 in Bluefield, W. Va., is swinging along and promises to attract thousands of viewers from coal producing areas around the country. This 14th edition of the Southern Appalachian Industrial Exhibit is the largest industrial show in either of the two Virginias, and this year will have over 300 exhibiting firms, according to its planners.

A new sidelight will occur this year. High school students of the top three grades in West Virginia, Virginia and Kentucky mining regions are urged to submit inventions, drawing or scale models of some phase of mining. Winners will receive cash awards on the closing day of the show. Other events that have developed over the years are the Gadget and Fossil contests, and the selection of the coal show queen and her attendants.

Demand Oil Curb

The domestic oil industry, which has been hit hard by reduced demand for its products, is asking for mandatory curbs on petroleum imports. The plea, made by the executive committee of the Independent Petroleum Association of America, finds its chief power in the threat of mandatory controls if importers do not comply with "voluntary" controls. Though the voluntary program has been having some success for six months, its weaknesses have been that a handful of companies have refused to comply, and the obvious difficulty of making a voluntary program stick for the long term.

To meet this problem, the association wants to put teeth into the program by fixing penalties on imports that exceed levels specified by the President. Excessive imports would be subject to a duty "equivalent to 30% of the value of the cargo at point of entry" and would be subject to "specific penalties including damages and confiscation of cargo."

OTTO GRESSENS (right), and Rep. T. J. O'Brien (D) Ill., discuss depletion rate.

Depletion Rate Questioned

A hike in the depletion rate for coal from the present 10% to at least 15% is being pressed for by the National Coal Association. In a message delivered to the House Ways and Means Committee in hearings on tax revision, Otto Gressens, vice president, Peabody Coal, and chairman of NCA's tax committee, pointed out that coal has had a 10% depletion rate since 1951 while producers of such minerals as granite, slate and fire clay receive 15%. Coal's direct competitors, oil and gas, receive 27½%.

Mr. Gressens said future demands for energy will require even greater coal production. The increased tax deduction would enable the coal industry to set aside funds for opening new mines as present diggings are worked out.

Rare Appearance

The 1958 Coal Convention of the American Mining Congress to be held in Cincinnati, Ohio, May 5-7, will feature as a luncheon speaker on the opening day, John L. Lewis, president, United Mine Workers of America. This will represent one of the few appearances of the United Mine Workers' executive be-

(*Continued on p 56*)

No. 2 in a series

Right off the Wire

A double submarine cable, 2400 miles long, gives direct telephone service between California and Honolulu. It reaches ocean depths up to 3½ miles. Simplex manufactured 60% of the cable.

Dissimilar, non-ferrous metals, including aluminum, copper, magnesium, titanium, brass, zinc, silver and gold can now be bonded by a new ion-exchange process.

Doppler radar, installed in aircraft, is being tested by commercial transport planes. If satisfactory, it is expected to have far-reaching effects on civilian navigation.

By using a 3800-gallon bag of rubber-coated rayon to contain liquids, a truck trailer can now serve a double purpose. Various linings make the bags suitable for corrosive or edible liquids. It is planned to make them in larger sizes for barges or storage.

A new pencil feeds lead automatically to maintain the correct writing length.

A new low-temperature laboratory is equipped to produce fifty quarts an hour of liquid hydrogen at −423°F. and eight quarts an hour of liquid helium at −453°F.

A color-video tape recorder-player has been announced.

A new off-shore drilling platform is able to operate in 600 feet of water. Present equipment is limited to about 100 feet.

A model of an ion-propelled rocket has been exhibited. Theoretically it should have an efficiency of 90 per cent and a speed of 25,000 miles per hour. Power would be derived from a nuclear reactor.

A mechanical construction kit for adult tinkerers contains 5,000 parts. It is claimed that a working model of almost any machine can be built with it.

One of the new European cars has three headlights mounted side-by-side behind a screen of curved glass. The middle lamp is pivoted and turns with the wheels.

A single drop of a new adhesive, used to join two pieces of metal, has supported a load of 5,000 pounds.

Paint that changes color at high temperatures is being used in oil refineries as a safety measure.

Man-made lightning, to test insulated cable, is produced by the new 1,400,000-volt impulse generator in the Simplex research laboratories.

A new fuel for jet and ramjet engines has a boron-hydrogen base and should increase the range of aircraft using it by forty per cent.

A new kind of "electric eye" uses radiation from a small amount of strontium-90 instead of an electric light. It requires no power supply and is not subject to interference from dust or smoke.

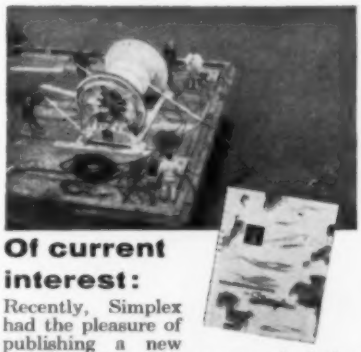
A twenty-five acre business center, being built in Venezuela, is in the form of a helicoid. It will be 365 feet high and access will be by a spiral ramp. At the top will be a 170-foot aluminum dome housing an exhibition hall and television station.

A generator has been designed that produces electric power directly from the chemical reaction of hydrogen and oxygen.

Since 1950, over 4000 miles of cable protected by Simplex C-L-X type sheaths have been put in service. No sheath failures have been reported.

A new eighteen-pound refrigerator will operate for fifty hours on a bottle of propane gas, or indefinitely on household current.

The problem of shipping giant transformers by rail has been minimized by making the transformer the central part of the car. Both height and weight are thereby reduced.



Of current interest:

Recently, Simplex had the pleasure of publishing a new book called TRANSOCEONICS, depicting the historical development of undersea telephone cables. If you have read TRANSOCEONICS, you will recall the magnitude of some of the projects undertaken by Simplex.

We hope you will also remember that Simplex manufactures cable for nearly every electrical need, regardless of project size. All the proficiency acquired during our seventy years of leadership in cable manufacturing and research is at your disposal. Call or write to:

SIMPLEX WIRE & CABLE CO.
Cambridge, Massachusetts and
Newington, New Hampshire

Simplex

Highest quality cables for: Mining
Power & Lighting • Construction
Transportation • Communications
Signalling

"the American manufacturers of transoceanic telephone cables"

People in Coal

J. W. Woomer slated for SME office

Up the Ladder

J. W. Woomer of Pittsburgh, Pa., who will be president-elect of the Society of Mining Engineers for 1958 and president in 1959, is an old hand around the mining world. Born in Phillipsburg, Pa., in 1905, he studied at Pennsylvania State University, receiving a B. S. in 1925 and an E. M. in 1931. An honor student, he was a member of Tau Beta Pi engineering society.

Early in Mr. Woomer's career he went to work for Pittsburgh Coal Co. as a superintendent. In 1936, after 10 yr with Pittsburgh Coal, he became chief engineer at Hanna Coal Co., with whom he stayed till 1939. During this time, he also served as a consulting engineer with this firm.

He worked from 1939 to 1942 as general manager-mines for W. H. Warner & Co., but terminated his association with them in order to devote full effort to the consulting field. He formed the consulting organization, J. W. Woomer & Associates, and has served as an advisor to England, China, Mexico, Greece, Turkey and other countries. His efforts have not been confined within narrow limits as he has been called in on problems concerning lignite, clays, potash, copper, uranium, iron, oil sands and shales as well as coal.

Mr. Woomer is prominent in the affairs of the coal division of SME, is a director of the Engineering Society of Western Pennsylvania, and is a member of the Explorers Club. *Coal Age* congratulates him on his climb up the ladder.

Raymond Mancha, a recognized authority on mine ventilation, and ventilation vice president with Joy Mfg. Co. for the past 12 yr, has retired from business so as to have more time for personal interests and study. Mr. Mancha's business life since graduation from M. I. T. in 1926 has centered around ventilation and he has contributed extensively to the literature of the field. His resignation, coming at the age of 55, fulfills a long awaited plan.

John E. Osmanski, formerly manager of personnel for the Operating Dept., Island Creek Coal Co., and working in Holden, W. Va., has been transferred to the firm's general offices in Huntington, W. Va., where he will become personnel manager for company-wide activities. Mr. Osmanski, who did his undergraduate work at Haverford College, has a masters degree in industrial psychology. He was formerly director of personnel at Crucible Steel Co., in Pittsburgh.

T. J. Crocker, manager, Bethlehem Mines Corp., has retired from active business. Mr. Crocker has been with Bethlehem since 1915 and has occupied his present position since 1951. He is a member of the American Institute of Mining, Metallurgical and Petroleum Engineers; American Mining Congress; and operating committee, Bituminous Coal Operators Association.

H. J. Mandeville, press representative for Eastern Gas & Fuel Associates, Coal Div., has retired after 21 yr in that capacity with the coal mining organization.

Mr. Mandeville is a native of Iowa where he attended Cornell College, Mt. Vernon. After service in World War I he was a newspaper reporter, city editor and managing editor with Iowa daily newspapers. Later in his career he became an industrial relations man and began representing Eastern in 1936.

James F. Wildey has been named to the newly created position of director of safety and inspection for Bethlehem Mines Corp., with headquarters in Johns-

town, Pa. Since 1948 he has worked in various positions in the mechanical department at the firm's Marion Div., Fairmont, W. Va.

L. H. Chalfant has been appointed manager of Bethlehem Mines Corp., Johnstown, Pa., succeeding **T. J. Crocker** whose retirement became effective February 1. **E. R. Luy**, superintendent of the corporation's Barbour-Randolph Div., Buckhannon, W. Va., succeeds Mr. Chalfant as assistant general manager.

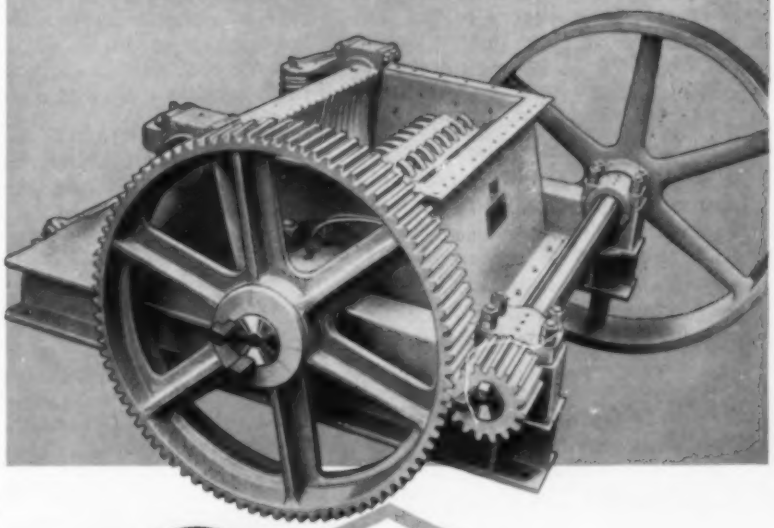
Clinton H. Hoch has been chosen as staff representative for the mining, coal mining, cement, quarry and mineral aggregates sections of the National Safety Council. Mr. Hoch has had fine background in safety and mining as safety instructor with the Pennsylvania Dept. of Mines and as a safety engineer in Brazil.

Obituaries

James D. Francis, widely known in the soft coal industry and associated during his lengthy career with numerous coal companies, died in Cabell Huntington Hospital, Huntington, W. Va. At the time of his death, he was chairman of the board of the Powellton Coal Co., Princess Elkhorn Coal Co., Princess Coal Sales Co., and Mallory Stores, Inc. During his impressive 40-yr career he was head of Island Creek Coal Co. and was the central figure in founding Appalachian Coals, Inc., a marketing agency designed to stabilize chaotic and unprofitable coal prices which existed around 1931. Mr. Francis was a leader in outside activities which included community services in Huntington as well as such tasks as directing the First Huntington National Bank and serving as director of natural resources production for the U. S. Chamber of Commerce. As a graduate and trustee of Pikeville

IMPROVED DESIGN *for crushing*

COAL... SLATE... WASHERY
REJECTS... MINE REFUSE



McLANAHAN SINCE 1835

Super
BLACK DIAMOND
CRUSHER

- Steelstrut Toggle automatically protects against uncrushable materials
- Quick adjustment for product size
- Cut steel gears

Now available at moderate cost are many of the famous Rockmaster Crusher features. This is a rugged, all-steel crusher—heavier than the conventional Black Diamond, yet not so heavy or costly as the Rockmaster. Super Black Diamond has split bronze bearings, easily-removable crushing plate and steel segment rolls. *Write for Details.*

McLANAHAN & STONE
CORPORATION
PIT, MINE AND QUARRY EQUIPMENT HEADQUARTERS SINCE 1835
250 Wall Street, Hollidaysburg, Pennsylvania

AT CONSUMERS COMPANY'S QUARRY

P&H ELECTRICS PROVE

In the 100-ft. deep mammoth Consumers Company limestone quarry in McCook, Illinois, this 5 cu. yd. P&H Electric Shovel is proving to be a vital link in the production of crushed stone. This P&H Model 1500 loads a steady stream of 15-ton trucks to keep crushers operating 'round-the-clock.

This maximum availability coupled with a minimum of maintenance is typical of P&H performance in important mines and quarries throughout the world. That's why leading operators are choosing P&H Electrics for both new installations and replacements.

Comparison tests have proved that two exclusive P&H features pay off in *continuous profitable production:*

MAGNETORQUE,® the electro-magnetic type coupling that transmits power from hoist motor to dipper for faster action, greatly reducing shock and impact to the hoist gear train and motor.

ELECTRONIC CONTROLS, the fastest acting type of control available on electric shovels, providing the smoothest, quickest production cycle known.

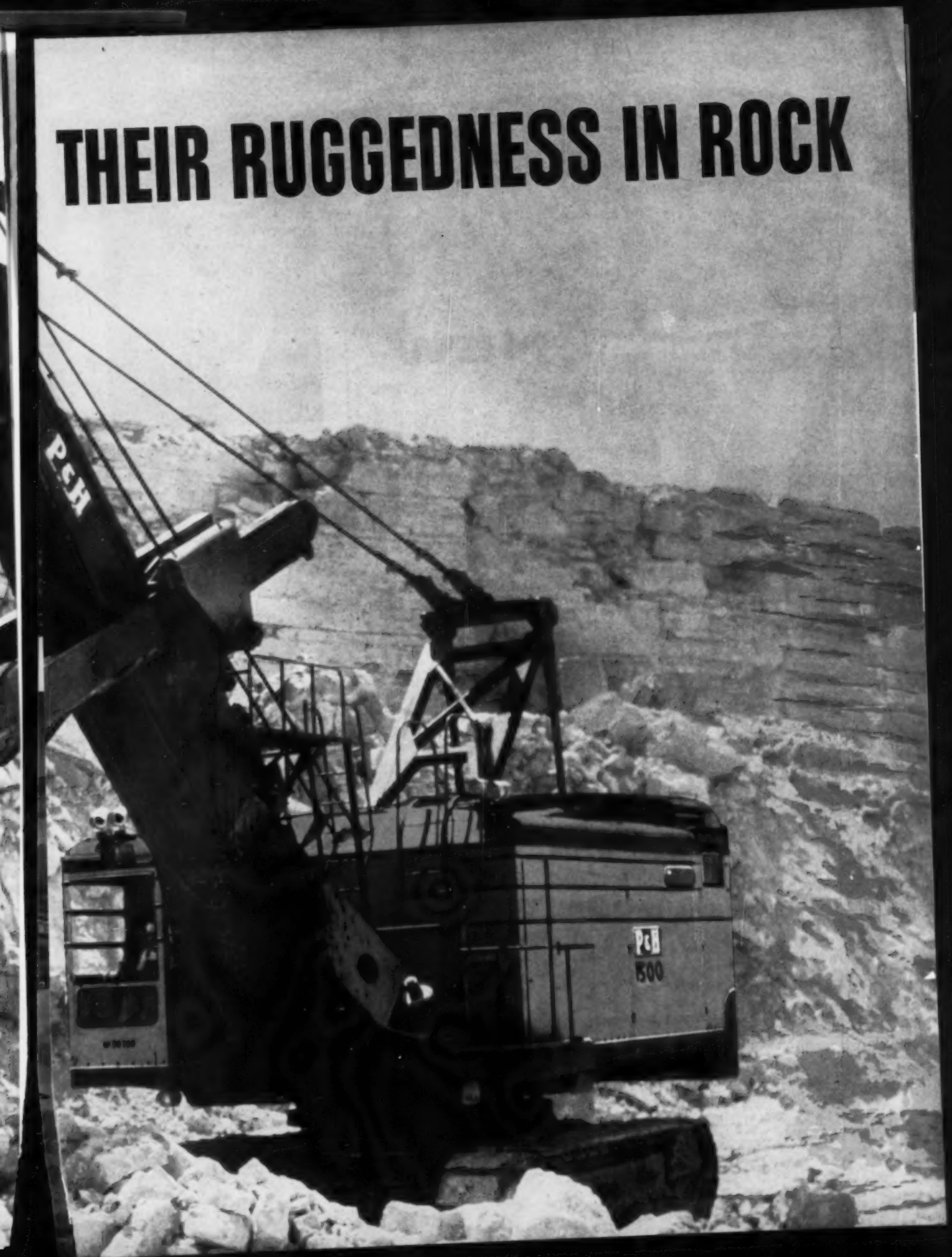
With P&H you get single source responsibility . . . another distinct advantage experienced only by users of P&H Electric Shovels. P&H designs, manufactures and applies all electric rotating equipment specifically for electric shovel service.

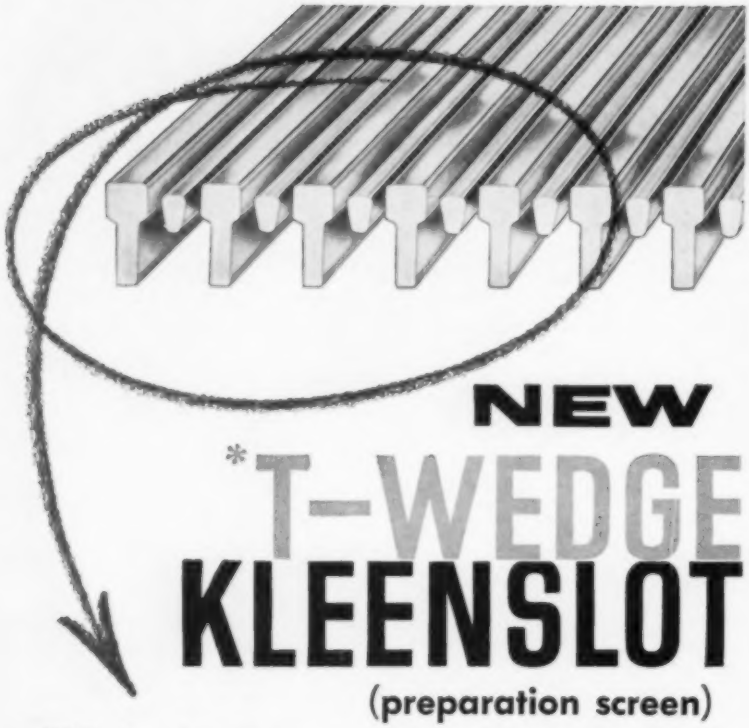
P&H ELECTRIC SHOVEL LINE: 3½ through 10 cu. yd. capacities

HARNISCHFEGER

Construction & Mining Division
Milwaukee 46, Wisconsin

THEIR RUGGEDNESS IN ROCK





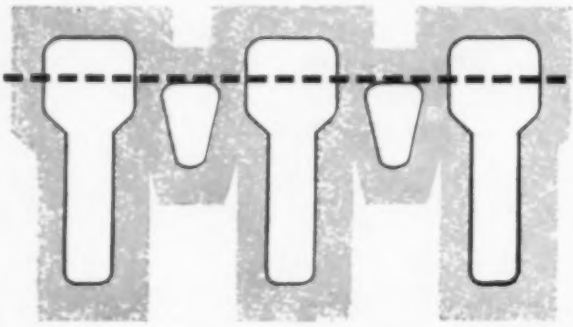
NEW

*T-WEDGE

KLEENSLOT

(preparation screen)

screen worn to this point equals new standard type screen



"T" and "WEDGE" wire combine to create the ultimate in...

GUARD BAR DESIGN - high "T" profile wire between every wedge shaped wire performs as guard bar *and* screen

GUARD BAR ECONOMY - new design effects added screening surface, small screen efficiency with large screen life

with *I.F.A. *independent flexing action for non-blinding, non-clogging performance*

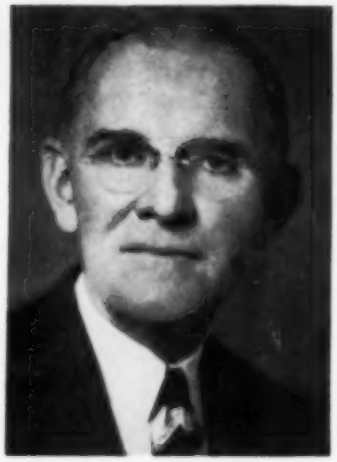
new T-WEDGE screen is especially adaptable for flumes or vibrator applications—can be easily interchanged with other types of Kleenslot screens without mechanical changes—abrasion resistant stainless steel

FOR ADDITIONAL INFORMATION . . . write

WEDGE-WIRE CORPORATION
Wellington, Ohio

*patent applied for

People in Coal *(Continued)*



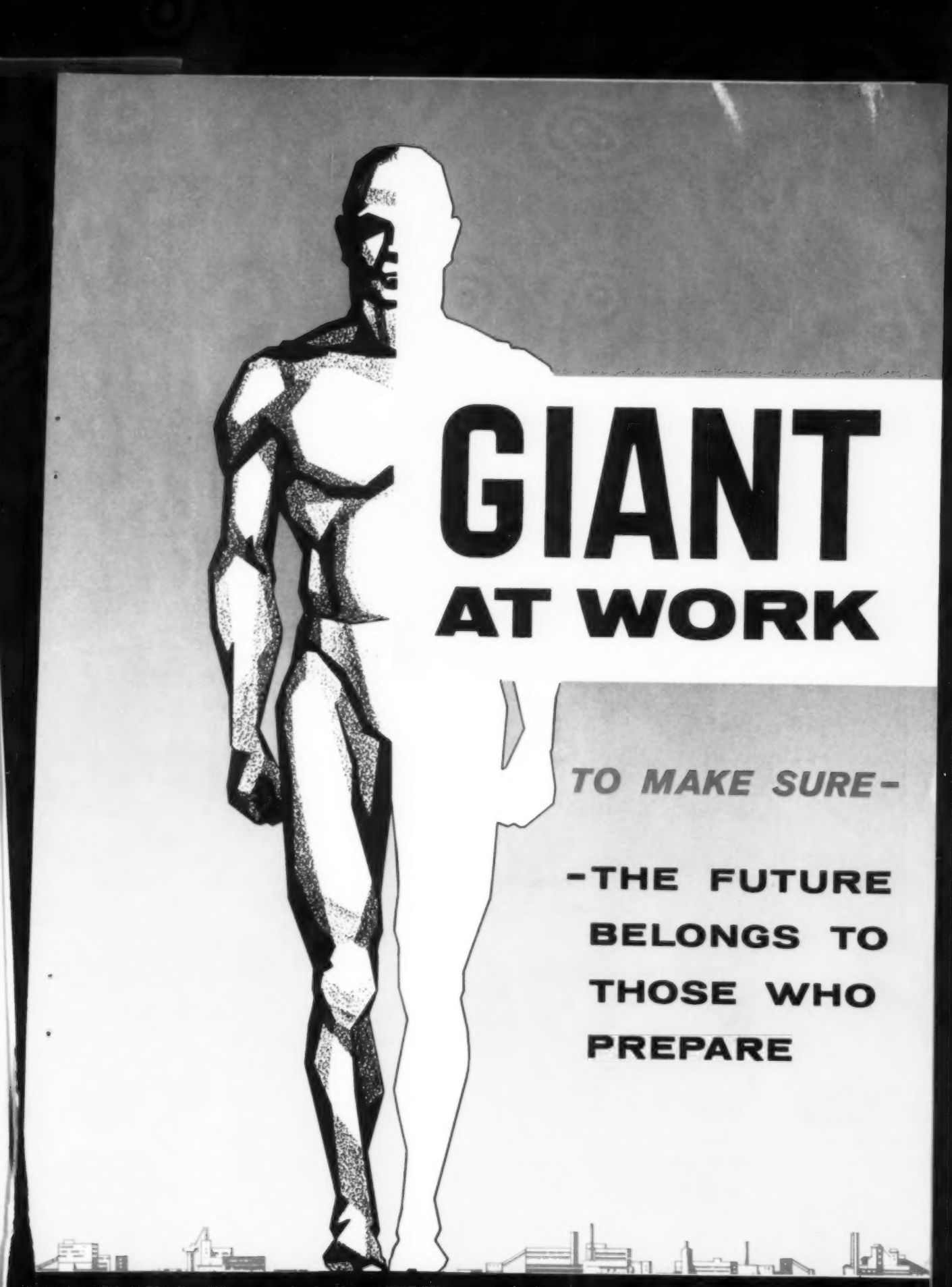
Junior College, he helped raise funds for the institution and was instrumental in the purchase of a farm which the college now operates. Surviving him are his widow and a son and daughter.

Carl C. Crowe, secretary and assistant treasurer of the National Coal Association, died of a heart ailment. He was 60. Mr. Crowe, a native of Morganfield, Ky., had been with the coal association since 1919 when the trade group was only two years old.

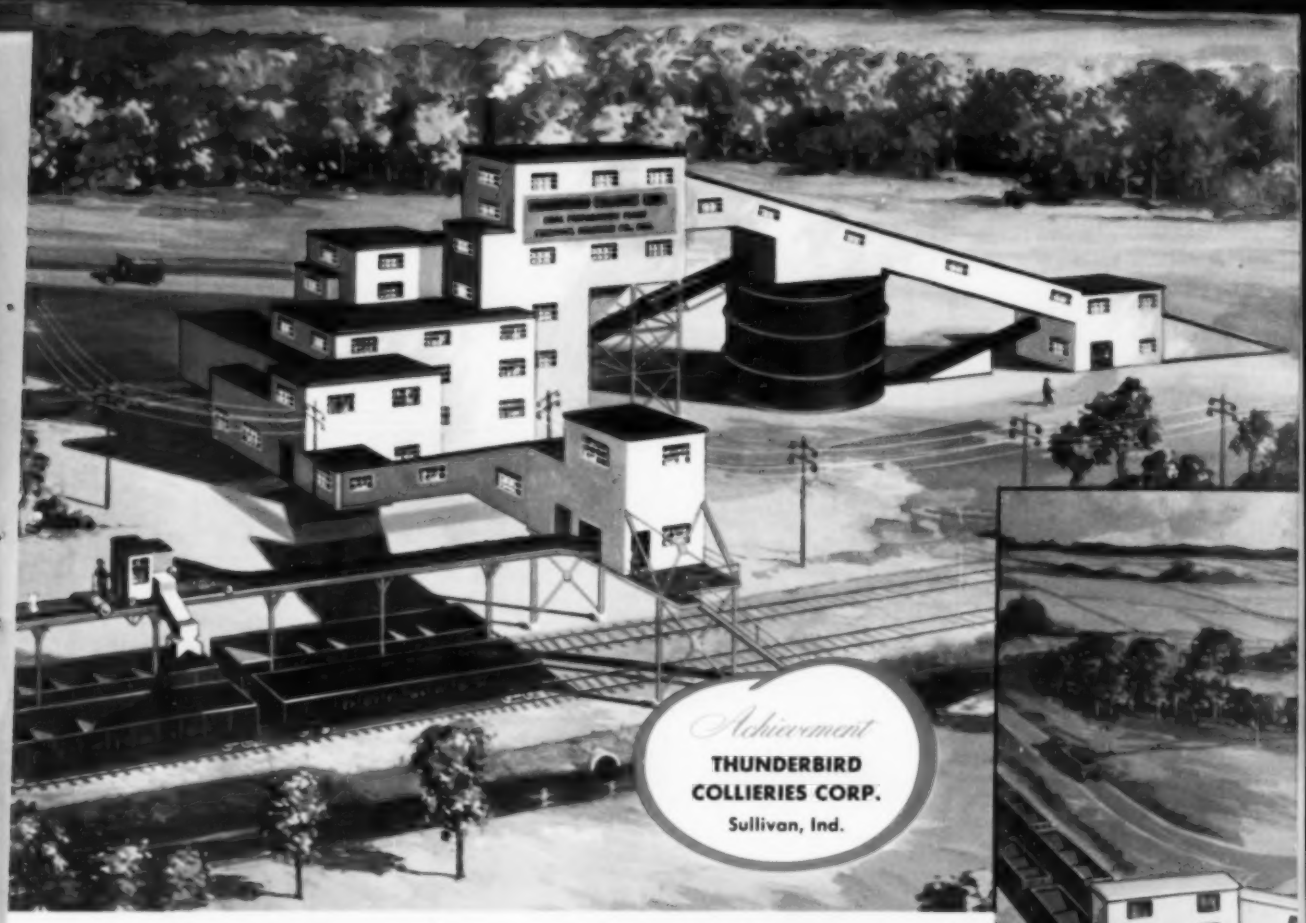
Lorenzo Sibert Evans, 83, of Richmond, Va., a former Chesapeake & Ohio Ry. Co. and coal mine executive, died recently. When he retired in 1946, he was assistant to the senior vice president of C&O. He was the founder and president of Atlantic States Coal & Coke Co., vice president of Clinchfield Fuel Co., president of Eastern Coal & Export Corp., and was a member of the executive committee of the American Coal Association.

Harry H. Pinkney, 81, of Canon City, Colo., a retired mining engineer and coal mine operator who had served with the Canon Reliance Fuel Co., passed away. Born in Bishop Auckland, England, Mr. Pinkney was educated at the U. S. Military Academy at West Point, N. Y. He entered the mining engineering profession in West Virginia.

William M. Spears, former district manager for *Coal Age* and *Engineering & Mining Journal*, died recently while on retirement in Clearwater, Fla. Before joining McGraw-Hill in 1919 as an advertising copy writer, Mr. Spears (Hi) worked for the Carnegie Steel Co. and the Maryland Gas Co. Prior to this he was editor-manager of the Lonaconing Advocate. He was a resident of Shaker Heights, Ohio, before he moved to Florida.


GIANT
AT WORK
TO MAKE SURE-
-THE FUTURE
BELONGS TO
THOSE WHO
PREPARE

GIANT
AT WORK
HERE
Achievement
RIVER QUEEN PLANT
Peabody Coal Co.
Central City, Ky.
RIVER QUEEN COAL CO.



HERE and HERE

Meeting the demand for increased tonnage capacity with economy of space and equipment, the McNally Giant is ready to work for you.

New standards of clean, efficient separation up to 1000 tph have been established in these new plants! Twin construction of the ten-foot wide washing compartments provides better bed distribution! Great capacity with compactness and simplified plant layout! Thirty percent greater washing area than the largest McNally Washer previously available! Proved savings in horsepower per ton! Here is working proof of another industry stride towards finer products with better profits.

The Giant with its ten-foot wide washing compartments is the accumulation of McNally Pittsburg's years of experience and thorough knowledge of coal washing problems. It embodies welcome refinements in automatic operation, and ease of maintenance and adjustment. Its trim design has made possible the elimination of special conveyors and cumbersome attendant equipment. It is so designed that a middlings rewasher can be included as an integral part of the unit—but with independent control. Impulse valves of the Giant are of a new balanced cylindrical type that provide unusual flexibility of adjustment. Maintenance and replacement parts stocking is further simplified by the identical twin cell design and the duplication of many component parts.

These are but some of the reasons why these three of the country's leading new plants are built around the McNally Pittsburg Giant Washer.

In the River Queen, the Thunderbird, and Squaw Creek, new Giants are steadily processing upwards of 750 tph. They are

For *Know-how*

Ask the Men from McNally Pittsburg

doing it to new standards of efficiency, cutting costs, boosting profits. They are proving again that the future belongs to those who prepare.

It will pay you to know about the McNally Giant. Get the men who know coal from the ground up to work with you on your next project, large or small. Just mail the card for the new McNally Pittsburg Giant Washer Bulletin.

Gentlemen:

☐ Please send the new bulletin on the McNally GIANT.

We also need information on a complete new plant that will wash_____ inches by 0 at_____ tons per hour and dry_____ inches by 0 at_____ tons per hour.

Name_____ Title_____

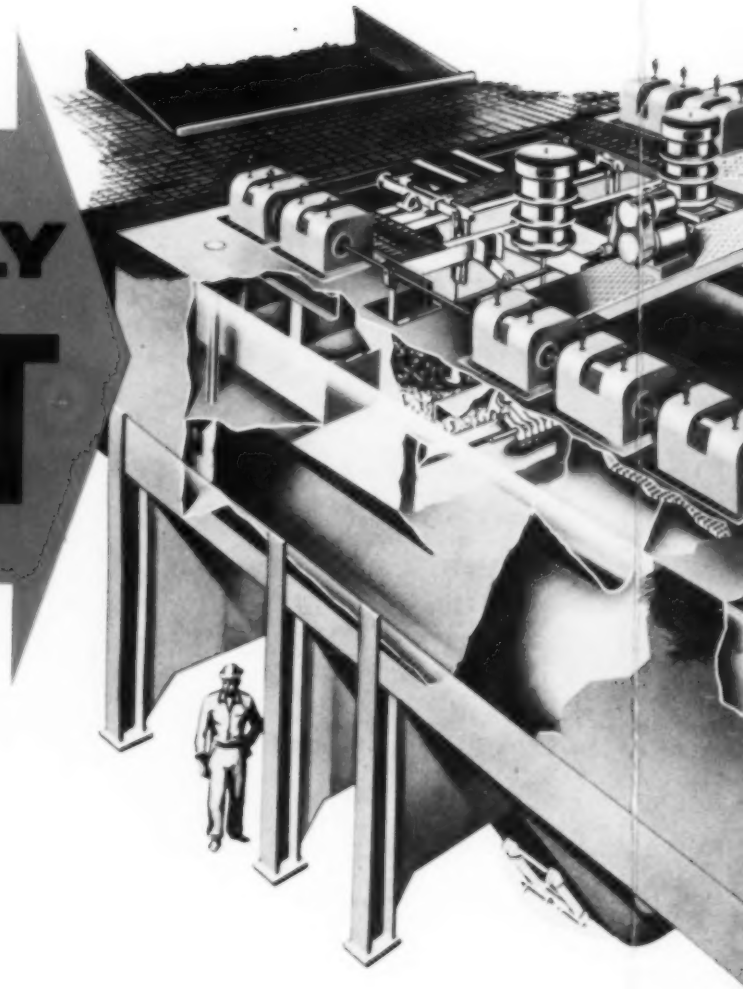
Company_____

City and State_____

☐ Have Sales Engineer call for further consultation.

c

THIS IS THE McNALLY GIANT



The McNally Giant Washer contains these outstanding new features:

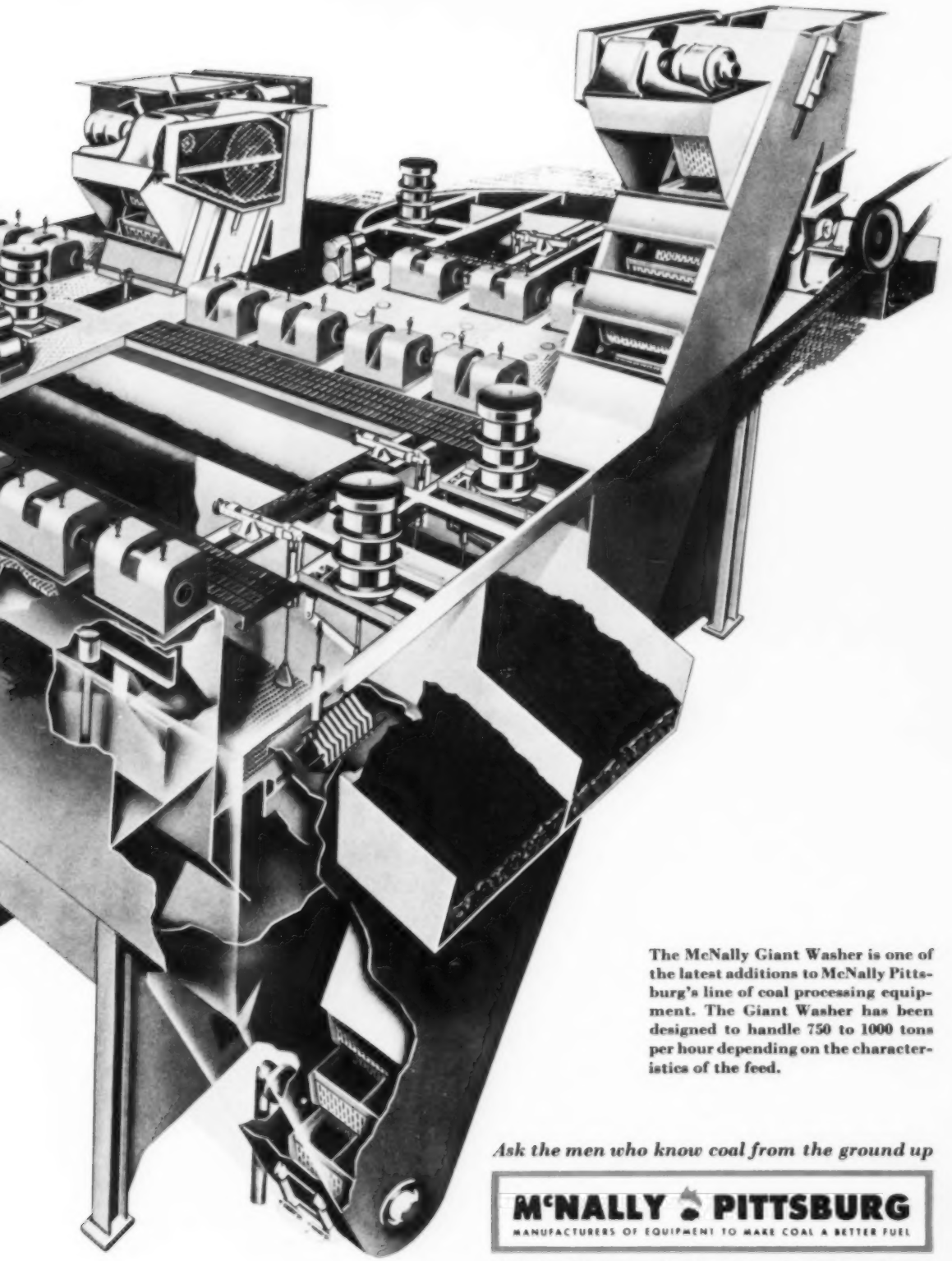
1. INCREASED TONNAGE CAPACITY . . . WITHOUT INCREASING THE DIFFICULTY OF CONTROLLING TRANSVERSE IMPULSE DISTRIBUTION.
2. SIMPLIFIED IMPULSE CONTROL VALVES.
3. HYDRAULIC DELIVERY OF HUTCH MATERIAL . . . FROM EACH COMPARTMENT TO ELEVATOR.
4. DUPLICATION OF COMPONENT PARTS . . . REDUCES THE NUMBER OF DIFFERENT REPLACEMENT PARTS NECESSARY FOR MAINTENANCE.
5. SEPARATE REWASH JIG FOR RE-TREATING CRUSHED MIDDLINGS . . . WITH INDEPENDENT CONTROL OF THE SEPARATION AND PRODUCTS DISPOSAL.

FIRST CLASS
PERMIT No. 93
(Sec. 34.9, P. L. & R.)
PITTSBURG, KANS.

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

4c-POSTAGE WILL BE PAID BY—

McNally Pittsburg Mfg. Corp.
PITTSBURG, KANSAS



The McNally Giant Washer is one of the latest additions to McNally Pittsburg's line of coal processing equipment. The Giant Washer has been designed to handle 750 to 1000 tons per hour depending on the characteristics of the feed.

Ask the men who know coal from the ground up

McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation — Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio
Engineering and Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio

Section of the 36-inch neoprene belting network in Amherst No. 4. Company is mining the 42-inch bottom split of the Eagle seam.

Why NEOPRENE is the belting choice at Amherst No. 4

In Amherst Coal Company's No. 4 Mine at Accoville, West Virginia, nearly all the conveyor belting is neoprene. The Company uses a long-wall mining system with all-belt coal removal. Mine production averages 1800 tons per day of by-product coal.

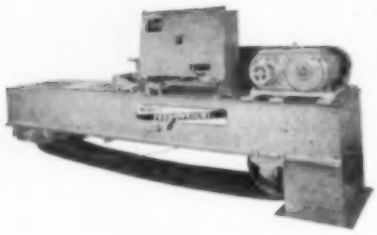
Neoprene-covered belting is Amherst's choice because of the long-term economy it provides. Neoprene provides lasting protection against fabric damage by acid water, mold and mildew. It is unaffected by exposure to oil and grease. It offers excellent resistance to cutting, tearing, aging and abrasion. Neoprene's resistance to sunlight and weather above ground adds materially to conveyor belt life. And, because of its fire resistance, neoprene provides an extra safety factor — it will not support combustion.

Next time you replace your conveyor belting or buy a new conveyor, be sure to specify neoprene. Its combination of properties means added economy and safety. We would like to tell you more about neoprene. A request will put your name on our mailing list for regular, free copies of the Elastomers Notebook. Just write: E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Department CO-2, Wilmington 98, Delaware.

DU PONT
REG. U.S. PAT. OFF.

Better Things for Better Living
... through Chemistry

NEOPRENE
made by Du Pont
for 25 years



Yes-feed by weight

with the MERRICK FEEDOWEIGHT, a self-contained automatic conveyor scale, with automatic gate for feed rate control. Powered feed regulator operates gate, without restraint on scale beam. Uniformly feeds bulk material BY WEIGHT; automatically totalizes weight of materials fed. Simple to operate. Slow moving parts mean long life. Easy to install, maintain.

Manufacturers of

The Merrick WEIGHTOMETER, which weighs any material carried on a belt conveyor without interrupting conveyor operation. Complete descriptive matter on request.

MERRICK SCALE MFG. CO.
Engineers and Mfrs. of Automatic Weighing Equipment
PASSAIC, N. J.

Coal Abroad

Boom in Brown Coal

European nations take a new look at Cinderella among fuels as need for energy sources mounts.

Brown coal, long neglected in the fuel picture, is assuming a new role in southeastern and eastern Europe. A United Nations Economic Commission report notes that combined European output, exclusive of the Soviet Union, has risen from 224,000,000 to 402,000,000 tons in the last 20 yrs—an increase of 80%. The output of hard coal rose in the same period from 582,000,000 to 615,000,000 tons, or only 6%.

Better Techniques—Besides increasing pressure for new sources of energy which has been marked throughout Europe, another explanation for brown coal's new popularity is the excellent progress achieved in extraction and utilization techniques. Much money is being spent on exploration as well. The Institute of Geological Exploration in Yugoslavia only recently reported rich deposits of high-quality lignite and brown coal discovered in Livanjsko and Dvanjsko. Bulgaria, Hungary and Rumania are all increasing their research on extraction of and uses for brown coal. Especially where open-cast working is possible, investments in brown-coal mining in many cases yield more effective results, reports indicate.

Large gains—It is also estimated that in relation to solid fuel consumption, brown coal and its derivatives in Europe have been amounting to more than two-thirds in Bulgaria, East Germany, Hungary, Rumania and Yugoslavia with similar figures for other countries. Output has risen fastest in countries that have little or insufficient hard coal reserves—Austria, Czechoslovakia and East Germany. Brown-coal mining is also progressing in the Soviet Union, experts say, although no exact figures are available.

GREAT BRITAIN

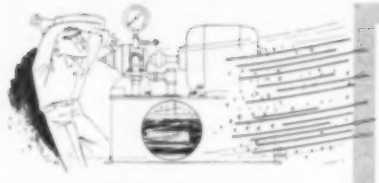
Coal for Sale

Britain has coal to peddle, reports its National Coal Board. After years of shortage the country starts 1958 with coal stocks at a very high level. The NCB says that at the end of 1957 stocks totaled 27.65 million tons, 6.66 million tons more than previous years. The high stocks have been brought about by falls in home consumption and exports, says that board, and "great efforts" to expand exports to the continent will be made in 1958. Feeling is, however, that England will have trouble trying to sell her coal because most West European consumers now have long-term coal contracts elsewhere.

RUSSIA

Coal, Coal Everywhere

There are two and one-half times greater coal reserves in Russia's Lena Coal Basin in eastern Siberia than in the rest of the world, Soviet news reported recently. The source stated that capacity already proven in the basin is 5 million tons, and mapping of deposits will be completed soon. The layers, which stretch along the entire length of the River Lena, are said to be between 100 and 130 ft thick taking up 19,800 sq mi. Russian reports go on to say that most of the fuel is "not inferior in quality to the best known varieties of coking coal." The South Yakutian region, they state, will be a main spark in the development of Russia's iron and steel industries.



Keep the storm out of your hydraulic system...

SCHROEDER LINE FILTERS

Your hydraulic system operates in a storm of harmful dirt particles, both from the air surrounding your system and from dirt particles generated, through wear, within the system itself.

Increase your operating efficiency...

Schroeder Line Filters increase your hydraulic system operating efficiency economically! Harmful, minute dirt particles, which can pass through the standard mesh strainer in your system, are filtered out and prevented from wearing out pumps, valves and machine components. Operating temperatures are lowered . . . hydraulic fluid life is extended . . . corrosive action is minimized! Schroeder Line Filters, with their replaceable filter elements, *can remove particles as small as .000118 inch from your hydraulic system.*

SCHROEDER BROTHERS CORPORATION
Nichol Ave., Box 72, McKees Rocks (Pittsburgh District), Pa.
HYDRAULIC • ELECTRIC and PNEUMATIC EQUIPMENT

Optional Spin-Dicator provides visual supervision of performance.

How to get better coal hauler engine performance—

use STANDARD DIESEL FUELS

STANDARD Diesel Fuels—now with STA-CLEAN*—deliver the *big* benefits that help you get (1) the power your coal hauler engines are rated to deliver, (2) the performance economy you must have, (3) the low maintenance costs that mean profitable operations.

STA-CLEAN is a STANDARD Diesel Fuel exclusive. This additive prevents fuel-injector sticking, insures clean burning of the fuel, prevents rusting of tanks, fuel lines, and injector parts.

Clean fuel. Standard exercises special care in handling diesel fuel to make sure it's delivered to you as clean as it was when it left the refinery. Contamination is eliminated. There's no foreign matter in the fuel to cause engine failure or maintenance problems.

Balanced distillation of STANDARD Diesel Fuels means good, as well as economical, performance; and with cleaner engine operation, you may be able to extend overhaul periods for your coal haulers.

Low pour point. STANDARD Diesel Fuels delivered to operators in cold climates have a pour point of −20° F. or lower . . . plenty of margin here to insure uninterrupted operation at low temperatures.

Get the facts about STANDARD Diesel Fuels from your Standard Oil industrial lubrication specialist. There's one of these specialists near you in any of the 15 Midwest and Rocky Mountain states. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

*Trade Mark

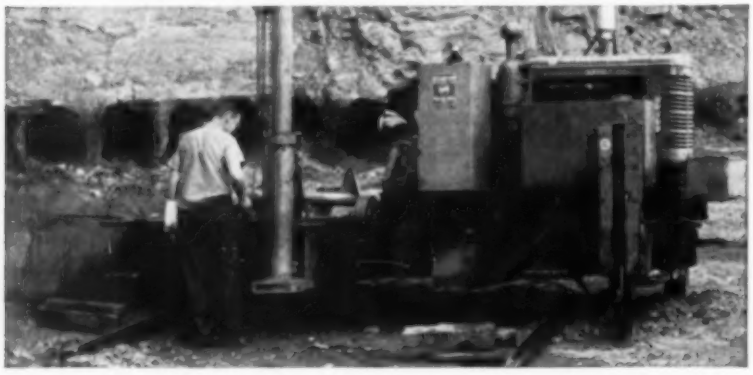
STANDARD OIL COMPANY
(Indiana)

STANDARD

Aeroquip Flexible Hose Lines Reduce Downtime on All Mining Equipment

Replace worn or damaged hose lines quickly by assembling Aeroquip Hose and Reusable Fittings right in the mine. A small inventory of bulk hose and reusable fittings meets all your requirements. You save money because equipment gets back on the job faster.

FOR DEEP MINE EQUIPMENT, Aeroquip Hose Lines provide dependable performance under all working conditions. The Aeroquip hydraulic lines on this stoper withstand abrasion, flexing and shock.



FOR STRIP MINE EQUIPMENT, Aeroquip Hose Lines perform well in many jobs. This rock drill, for instance, uses low-cost *SOCKETLESS* Fittings and Hose for engine fuel and air lines as well as Double Wire Braid Hose and Fittings for high pressure hydraulic lines. *SOCKETLESS* is an Aeroquip Trademark.

CALL THE AEROQUIP DISTRIBUTOR LISTED IN YOUR YELLOW PAGE PHONE BOOK

Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

INDUSTRIAL DIVISION, VAN WERT, OHIO • WESTERN DIVISION, BURBANK, CALIFORNIA
AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO

SOCKETLESS Fittings are Covered by U.S. Patent Number 2,805,088 and Corresponding Foreign Patents and Patent Applications.

Coal Abroad *(Continued)*

OVERSEAS FLASHES

Poland—Coal exporters are said to be complaining about slow railroad transports of coal to the major shipping port for Polish coal, Vienna, Austria. Vessels often wait idly for almost a week before coal is available for loading.

Czechoslovakia—Coal production in this country is reportedly scheduled to reach about 81 million tons this year, 6.2% more than in 1957. Hard coal production is slated for a 5.3% increase to 26.7 million tons.

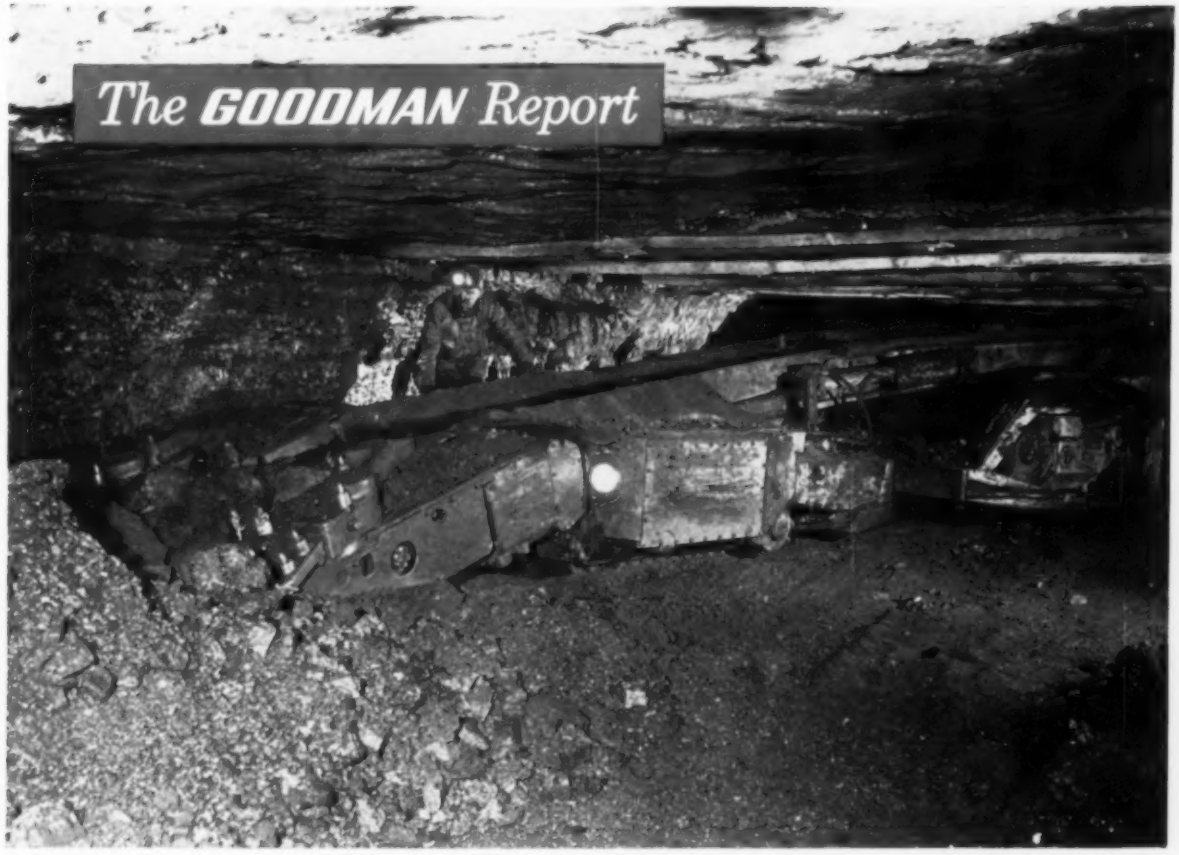
Hungary—An atomic reactor in Hungary will go critical this summer, according to news sources there. The reactor is described as "medium sized," and construction on it commenced in June, 1956, say the communists.

Russia—A new pit-propping machine, designed to lift and set in position metal tubes to reinforce roofs of horizontal coal seams which are being worked, has been successfully used in Siberia. Only three men are needed to operate the machine, reports say—an operator and two timberers. Although best for tubing, it can handle other types of pit props and can also serve as a hoisting crane.

Japan—This country's Coal Mine Composite Research Institute has signed a contract with Burma for the undertaking of a survey of coal mines in the southeast Asian country during a seven-month period starting in February. Six million yen to be spent on the survey will be part of Japanese war reparations to Burma.

Great Britain—The breakthrough in harnessing thermonuclear power has been announced by Harwell Research Laboratories of the United Kingdom Atomic Energy Authority. The goal was hotly contested throughout the world. The most striking thing about the breakthrough is the low cost of the apparatus, named "Zeta," which is reported to be around $840,000.

Finland—The Licensing Board has announced that coal import licenses for purchases in Europe and the United States will now be granted automatically. Finland, it is said, will require an estimated 2 million tons of coal in 1958 and has a trade agreement with the Soviet Union to buy some 600,000 tons. This leaves some Finnish officials' faces red because it is known that the United States prices are considerably lower than those of the USSR. The excuse given is that the Russians trade on the basis of world market prices, a weak line.



The GOODMAN 965 Loader

How to load out High Production in low Coal

The answer comes from a prominent mine in West Virginia where coal height averages a low 38 to 40 inches. Here, the working combination of a Goodman Type 965 Loader and three Goodman Type 870 Shuttle Cars loaded out and moved 473 tons of raw coal from 19 locations in one shift. The crew of eight averaged 59 tons per man. Average shuttle car load was 3.3 tons.

With an over-all height of 26½ inches, a clean up width of 7'1", gathering arm strokes of 55 per minute and complete maneuverability, the Goodman 965 loaded out coal in a steady profitable flow to the rugged Goodman 870 low vein shuttle cars. At a loaded speed of 4 mph, the cars quickly carried the coal to out-mine conveyors. Pacing the fast-working face equipment at this mine are Goodman Ropebelt conveyors in room panels and main haulageways.

Wherever Goodman machines are put to work, you can be sure of outstanding performance, high production and increased profits. For example, the 965 Loader . . . Goodman engineers powered this unit with four 20 hp continuous rated motors to give constant, even power under all loading conditions . . . long, rugged life and low maintenance.

Let us show you how Goodman machines can team up in your mine for higher production . . . greater profit.

*The 965 Loader and 870 Shuttle Car, as well as other Goodman models for higher coal, are available for either D.C. or A.C. operation.

The GOODMAN 870 Shuttle Car

GOODMAN
MANUFACTURING COMPANY
Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts

Republic's Certified-Strength Roof Bolts

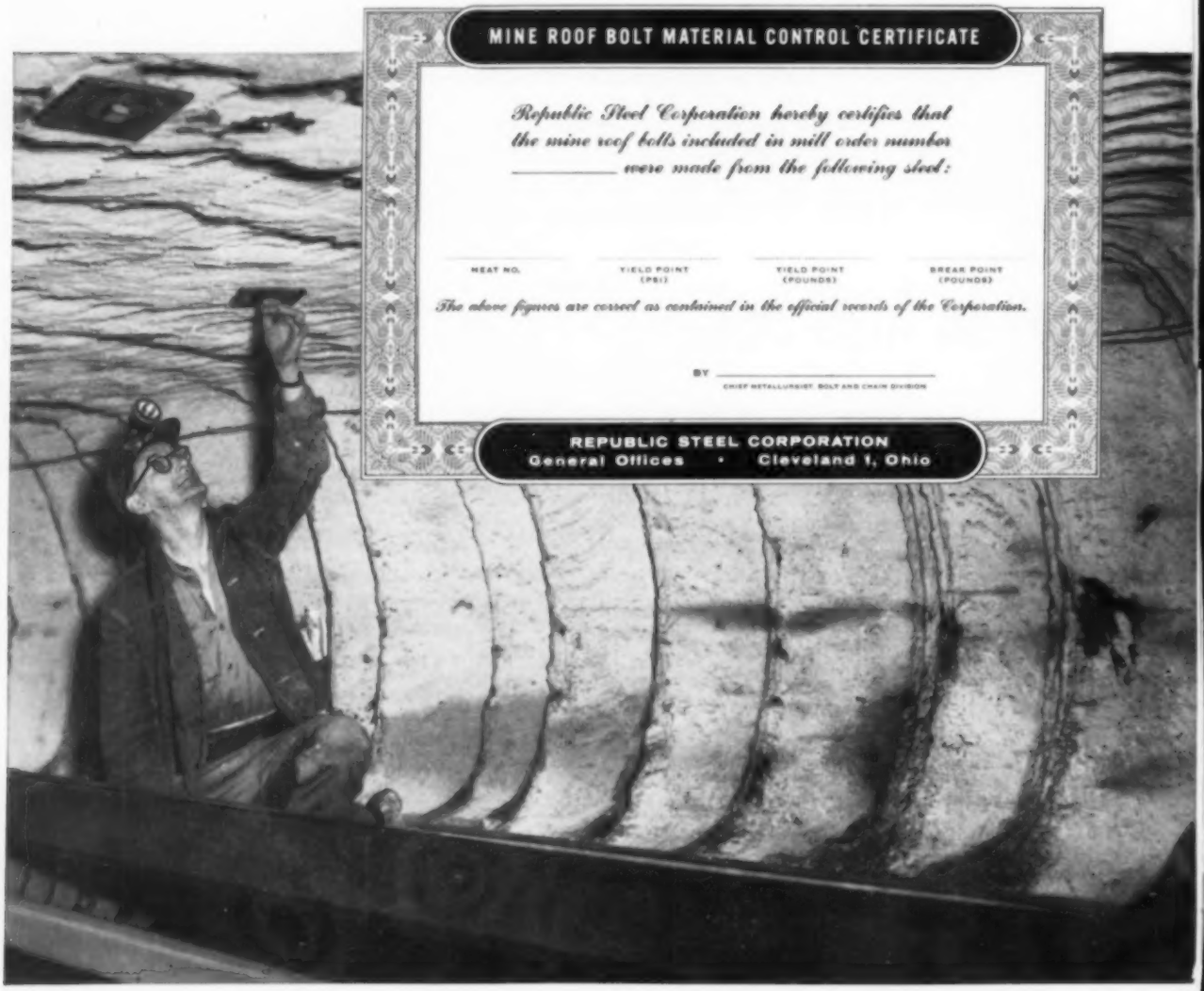
underwrite roof-control reliability

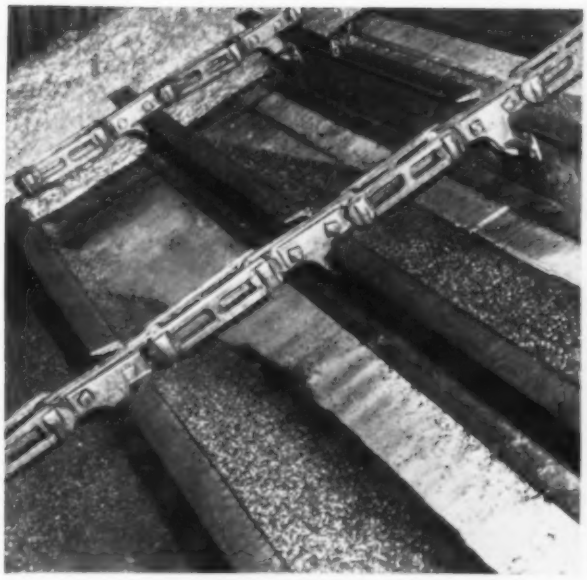
Bolted-roof reliability is made up of many factors —pattern, method of placement, type of strata— to name a few. But behind them all stands the strength of the bolt. That's why it pays to specify certified-strength Republic Roof Bolts, for full assurance of uniform top-holding power.

Republic is able to offer this extra measure of protection through integrated manufacturing control, from mining and blending of ores to final production of complete roof bolt assemblies. Each heat of steel destined for roof bolt use is regulated to provide required physical properties. Samples are tested to destruction to determine actual performance. Finally, each heat is kept separate so that finished bolts can be exactly identified.

As a result Republic is able to furnish a Material Control Certificate with every roof bolt shipment showing pre-tested performance, *guaranteed to meet or exceed the suggested mining standards contained in Specification ASTMA-306.* Moreover, this priceless assurance is yours, at no extra cost!

For full information on exclusive certified-strength Republic Roof Bolts, contact your local Republic office. Or mail coupon.


MINE ROOF BOLT MATERIAL CONTROL CERTIFICATE
Republic Steel Corporation hereby certifies that the mine roof bolts included in mill order number _____ were made from the following steel:
HEAT NO.
YIELD POINT (PSI)
YIELD POINT (POUNDS)
BREAK POINT (POUNDS)
The above figures are correct as contained in the official records of the Corporation.
BY
CHIEF METALLURGIST, BOLT AND CHAIN DIVISION
REPUBLIC STEEL CORPORATION
General Offices • Cleveland 1, Ohio



REPUBLIC HIGH STRENGTH STEEL IMPROVES SERVICE LIFE for many types of mining equipment. In the bottom of this drag-type, cleaning plant conveyor, for example, it provides excellent resistance to abrasion and corrosion. Far less frequent replacement is required as compared with a bottom made of ordinary carbon steel. Republic High Strength is also well suited to mine car and other mobile equipment use. Its high strength-to-weight ratio allows use of lighter gages. Dead weight is correspondingly reduced. Mail coupon for details.

REPUBLIC CAP SCREWS PROTECT PERFORMANCE of Ty-Rock Vibrating Screens, built by the W. S. Tyler Co., Cleveland, Ohio. Used for final assembly of major components, fine-thread cap screws of several steel analyses enable Tyler to distribute loads better and eliminate danger of fatigue failure due to vibration and cyclic loading. Republic Cap Screws are available in Hex Head, Flat Head and Fillister Head Types in a wide range of sizes, with fine or coarse threads. For full information on analyses and other data, send coupon.

RELIABILITY PLUS ECONOMY are two major advantages you secure when you specify Republic's new Truscon Steel "Budget Buildings" to solve housing problems. Ideal for hoist houses, control and equipment shelters, office and personnel use, "Budget Buildings" are easy to erect, dismantle and re-erect to meet changing needs. They are available for immediate delivery in 32-, 36-, 40-, 44- and 48-foot widths—12- and 14-foot heights—and any required length. Fully galvanized, they need no painting. One order delivers a complete package—all roofing, siding, windows, doors and hardware included. Send coupon for facts.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. C-5153
3124 EAST 45TH STREET • CLEVELAND 27, OHIO

Please send information on:
☐ Mine Roof Bolts ☐ High Strength Steel
☐ Cap Screws ☐ Truscon "Budget Buildings"

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

CAST ALUMINUM
Guyan
STRAINERS
ECONOMICAL and
LONG LASTING

TWO and THREE INCH SIZES
Write for literature
Manufactured by GUYAN MACHINERY CO. LOGAN, W. VA.

NEW SPEED AND DRILLING ECONOMY
WITH THE NEW IMPROVED
Parmanco
MODEL CD-51-57
COAL AND CLAY DRILL

• Augers Rotated by Vickers 21.5 H.P. Fluid Motor with Hydraulic Feed Finger Tip Controlled
• Cutting Shield And Guide Completely Automatic
• Drill Powered By 65 H.P. Water Cooled Motor.

Jack Foehrer, Pit Foreman says
"THE PARIS DRILL IS THE BEST WE HAVE EVER USED."
SEND FOR COMPLETE DETAILS
PARIS MANUFACTURING CO. PARIS, ILLINOIS

New Books

TVA Report

Annual Report of the Tennessee Valley Authority details activities of TVA during 1957. Topics covered in the report include water control, power, construction, fertilizer, forest resource improvement and tributary watershed projects plus appendixes and financial statements, statistical tables and power contracts and agreements. *Text 84 pp; appendixes 201 pp. 6x9¼-in; paper. $1.25, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.*

Coal Monograph

The Coal Industry, by M. Edmund Speare, offers factual information about the coal industry and is designed for use wherever general counseling work is conducted and for individual reference purposes in the choice of a career. *32 pp. 6x9-in; paper. $1, Bellman Publishing Co., Box 172, Cambridge 38, Mass.*

Rock Mechanics

Micro-Seismic Method of Determining the Stability of Underground Openings, by Leonard Obert and W. I. Duvall, contains a summary of the investigations conducted between 1940 and 1952. The report describes experimental procedures and the analysis of results. Examples of various types of mining problems to which the micro-seismic method is applicable are cited. *17 pp. 8x10½-in; paper; mimeo. Bulletin 573. 35¢, Superintendent of Documents, U. S. Government Printing Office, Washington 25.*

Bituminous Output

YEAR TO DATE	PRODUCTION
January 18, 1958	20,946,000
January 19, 1957	26,816,000

1958 output 21.9% behind 1957.
A month earlier output was 2.8% behind 1956.

WEEK ENDING	PRODUCTION
January 18, 1958	8,440,000
January 19, 1957	9,925,000

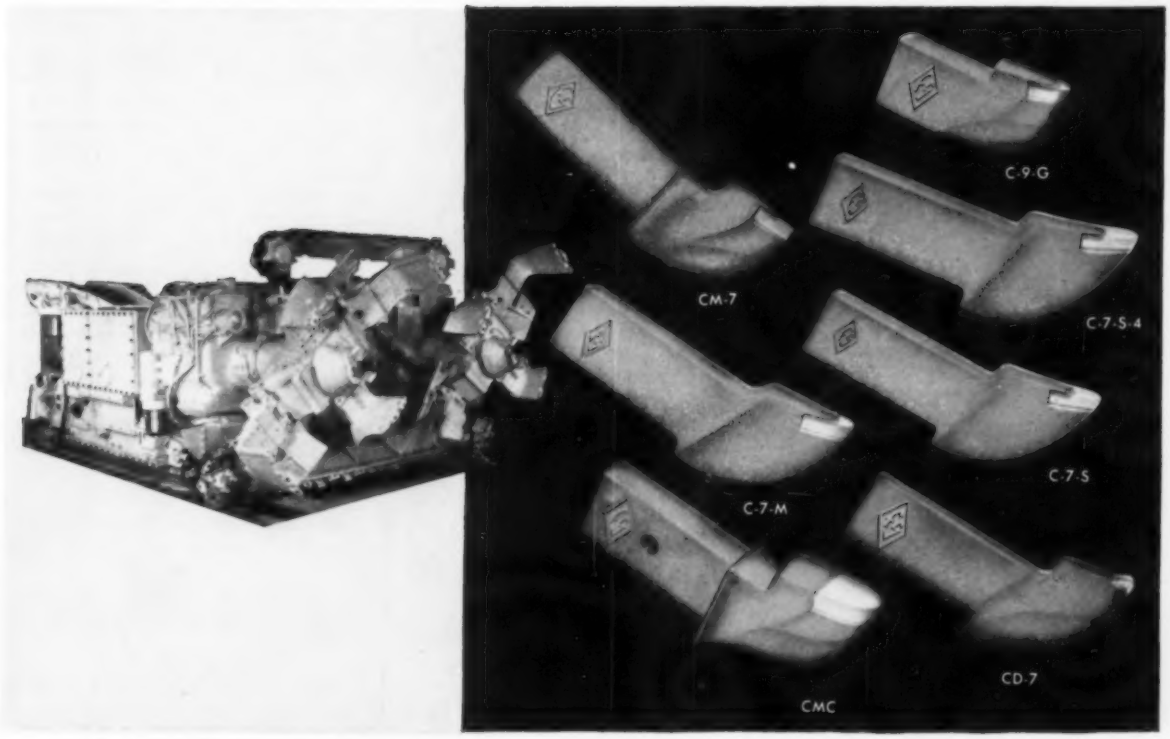
Anthracite Output

YEAR TO DATE	PRODUCTION
January 18, 1958	1,206,000
January 19, 1957	1,531,000

1958 output 21% behind 1957.
A month earlier output was 12.0% behind 1956.

WEEK ENDING	PRODUCTION
January 18, 1958	556,000
January 19, 1957	565,000

FIRTHITE Blue-Bit MINING TOOLS



Used on *GOODMAN* Continuous Borers for every mining condition

Firthite carbide inserts give Goodman Continuous Borers the "bite" that helps provide a steady flow of coal back from the working face —maintaining a high level of face efficiency and delivering more tons per shift at low cost per ton.

And because the FIRTHITE Blue-Bit line provides a full complement of cutting tools you can select the *right* tools and corresponding holders to suit working conditions in your field.

Consult the condensed table at the right for recommended tools or, if special conditions prevail, a Firth Sterling mining tool engineer will be glad to discuss the problem with you.

RECOMMENDED TOOL NUMBER			Cutting Conditions	Coal	Holder
Bore Arms	Chain	Clearance			
C-7-S CD-7	C-7-S	C-9-G	Light to Medium	Relatively Clean	½ x 1
C-7-M C-7-S-4 CM-7	C-7-S	C-9-G	Medium to Heavy	Occasional Impurities	½ x 1
CM-7 CMC	C-7-S-4 CD-7	C-9-G	Heavy	Large Quantities Rock Sulphur, Rolls	½ x 1

YOUR AUTHORIZED FIRTH STERLING MINING DISTRIBUTORS HAVE COMPLETE STOCKS FOR IMMEDIATE DELIVERY.

Firth Sterling

—INC—

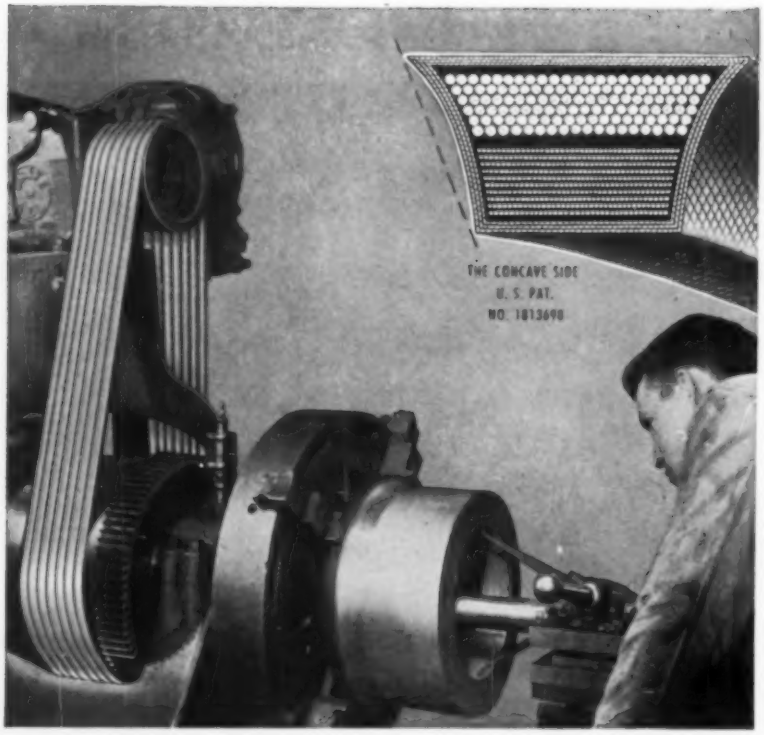
GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.

DISTRIBUTED BY:

AUSTIN POWDER COMPANY—Cleveland, Waynesburg, Evansville, Madisonville, Hazard, W. Frankfort, Clarksburg
UNION SUPPLY COMPANY—Denver
AMOS A. CULP—Birmingham
McCOMB SUPPLY COMPANY—Harlan
CARLSBAD SUPPLY COMPANY—Carlsbad
SERVICE SUPPLY COMPANY—Wheeling
DUNLAP WELDING & SUPPLY—Zanesville
MOLE-BITS COMPANY—Johnstown
U. S. STEEL SUPPLY DIVISION—Pittsburgh
CARL B. LEWIS—Scranton
GUYAN MACHINERY—Logan
THE RAINS SUPPLY CO.—Salt Lake City
SOUTHWESTERN ILLINOIS SUPPLY—DeSoto
COAL BIT COMPANY—Prestonsburg

PRODUCTS OF FIRTH STERLING METALLURGY

High Speed Steels
Tool & Die Steels
Stainless Specialties
High Temperature Alloys
Sintered Tungsten Carbides
Firth Heavy Metal
Chromium Carbides
High Temperature Cermets
Zirconium



WHY you get more service from V-Belts with concave sides

Each sidewall of a Gates V-belt is concave (Fig. 1) — a precisely engineered curve that makes V-belts last far longer.

HERE'S WHY: on the bend around the sheave, the concave sides of a Gates V-belt fill out and become straight (Fig. 1-A). Thus the belt makes full contact with the sides of the sheave, grips the sheave *evenly*.

This even contact distributes wear uniformly across the sides of the belt. Uniform wear lengthens belt life; keeps costs down.

MAKE THIS SIMPLE TEST

Bend a straight-sided belt (Fig. 2). The sides bulge at the bend causing uneven contact in the sheave groove (Fig. 2-A). Naturally, wear is greater at points indicated by arrows. Result: shorter belt life, increased belt costs.

To cut down-time and V-belt replacement costs, specify belts that grip evenly and wear longer. Specify Gates Vulco Rope — the V-belt with concave sides. The Gates Rubber Co., Denver, Colorado — *World's Largest Maker of V-Belts.*

There are Gates Engineering Offices and Distributor Stocks in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

Gates

TPA 109A

Gates Vulco Rope Drives

Preparation Facilities

Consemaugh Mining Co., Seward, Pa.—Contract closed with Kanawha Mfg. Co. for coal-handling installation to bring coal from underground to surface, comprising trip feeder, Differential rotary-dump, apron feeder, 150-ft underground cross belt, 1,100-ft slope belt on 11 deg incline, 270-ft transfer belt for above ground delivery. Mine rock also handled on same equipment. Capacity 500 tph. Completion scheduled for July, 1958.

U. S. Steel Corp., mine No. 10, Wilcoe, W. Va.—Contract closed with Kanawha Mfg. Co. for dumping facilities consisting of trip feeder, two rotary dumps (one for coal and one for rock) dump bins, Traylor feeder for coal, apron feeder for rock. Capacity 900 tph. Completion scheduled for June, 1958.

Slab Fork Coal Co., Gaston mine, Alpoca, W. Va.—Contract closed with Kanawha Mfg. Co. for four Deister No. 77 Double Deck Tables, centrifugal dryer, Heyl & Patterson cyclones and vacuum filter.

Highland Coal Co., Highland mine, Whitewood, W. Va.—Contract closed with the Daniels Co., Contractors, Inc., in conjunction with Mechanical Equipment & Construction Corp. for a DMS dense-media preparation plant to prepare 10x¼-in ROM coal. Capacity 150 tph. Estimated completion date June, 1958.

Jewell Ridge Coal Corp, Jewell Valley, W. Va.—Contract closed with Deister Concentrator Co., Inc., for two Concenco No. 77 Diagonal Deck washing tables to be used in cleaning the ¼x0 fraction of coal at their Jewel Valley plant, and for one Model 108 Concenco revolving feed distributor.

Mrak Coal Co., Eska, Alaska.—Contract closed with Deister Concentrator Co., Inc., for one Concenco No. 77 Diagonal Deck washing table, for cleaning ⅜-in feed.

Eastern Gas & Fuel Associates, Wharton mine No. 2, Wharton, W. Va.—Contract closed with Deister Concentrator Co., Inc., for six Concenco No. 77 Diagonal Deck washing tables for cleaning ⅛x0 coal, and for one Model 108 Concenco revolving feed distributor for feeding the six tables listed above.

Pocahontas Fuel Co., Pocahontas, W. Va.—Contract closed with Deister Concentrator Co., Inc., for two No. 77 Diagonal Deck coal washing tables to be used in cleaning ⅜x0 coal.

powered by White's Superior Diesel

Manitowoc 4500 cuts Ohio Stripper's cost 20%

Careful equipment selection is paying off for Terramana Brothers Coal Co., Steubenville, Ohio. For digging into 70 feet of overburden, they chose a Manitowoc 4500 shovel . . . and wisely specified the rugged, dependable White Superior Diesel for power. According to Terramana Brothers, this perfect combination greatly increased production and cut operating costs . . . resulting in more than 20% overall savings!

The big 4-yd. rig with a 60-ft. boom and a 45-ft. stick works two 10-hour shifts daily, powering away almost 400 yards per hour. The high torque Superior engine provides more line muscle . . . it pulls a full dipper with little effort. Under light load, it enables swings at top speed without surging. The faster and smoother cycle increases production!

Many cost saving advantages of Superior's design simplicity also contribute greatly to this economy. Easy accessibility of internal parts speeds servicing in close quarters. Down-time is practically eliminated because maintenance and repairs are reduced to a minimum. Many case histories show 35,000 engine hours with no major replacement parts required. Superior's first valve job usually comes due long after other engines would be completely replaced! Highly developed, open chamber combustion achieves optimum air and fuel mixture, low fuel consumption and easy starting. Precision construction throughout reduces wear and assures lowest lube oil consumption.

Specify White's Superior Diesel on your next new shovel or when you're re-powering. Power ranges from 225 to 2150 B.H.P. for all types of service. *Write for complete information today.*

White Diesel

WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY

Plant and General Offices: Springfield, Ohio

Toughest...Strongest

Specify Generals on your new equipment

THE GENERAL TRUCK TIRE

Tire Ever Built!

THE ALL NEW

GENERAL

L LOGGING
C CONSTRUCTION
M MINING

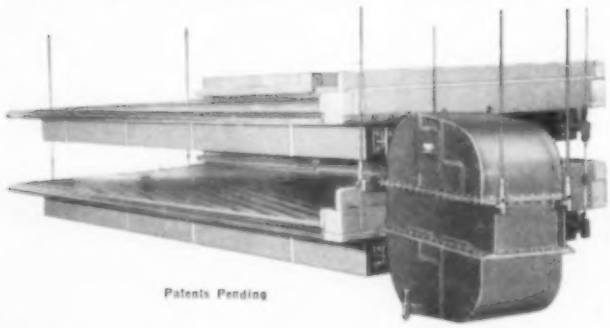
- built with NYGEN®
- deeper huskier TREAD
- crawler-like FLOTATION
- low rolling RESISTANCE
- grouser-type TRACTION

No matter what the job, weather, or terrain, this big husky new General LCM is your assurance of dependable, profitable all-round performance.

Featuring the amazing strength of Nygen cord plus a wider and heavier tread, this great new LCM gives you flotation and traction beyond all comparison.

Choose your toughest job and then choose the dependable, deep-bite performance of the all new General LCM.

THE GENERAL TIRE & RUBBER COMPANY
Akron, Ohio



Patents Pending

The CONCENCO® "77" DIAGONAL-DECK® Table Cuts Washing Plant Construction Cost

When it is necessary to produce more washed coal products the CONCENCO "77" Twin DIAGONAL-DECK Coal Washing Table helps you cut or completely eliminate the cost of new preparation plant construction.

This new table has twin decks, one over the other, each with the same capacity and washing characteristics of the older and still useful single deck SuperDuty® table. Thus, in the same unit of floor space, you can get twice as much washed coal as was formerly possible.

Cable suspension of the "77" greatly reduces impact to the building, making lighter new building construction possible. Send for Bulletin 77.

CONCENCO®
Feed Distributor

While unexcelled for feeding coal washing tables, the CONCENCO Feed Distributor effectively provides an accurate splitting of feed into any desired number and proportion of parts to feed circuits or machines in battery for their greater overall efficiency. It is a heavily fabricated all steel machine with motor drive requiring 1 h.p. or less in operation.

THE DEISTER ★
CONCENTRATOR
COMPANY
923 Glasgow Ave. • Fort Wayne, Ind., U.S.A.
CONCENCO PRODUCTS

★ *The ORIGINAL Deister Company • Inc. 1906*

fore an industry group and will be the first time that he has spoken at a meeting of the American Mining Congress.

The 1958 meeting is expected to be attended by between 2,000 and 3,000 coal mining officials, operating personnel, and equipment manufacturers from all parts of the United States. Theme for the meeting will be "Research for Progress". Subjects to be discussed will include the latest developments in underground and strip mining, coal preparation, mine safety, mine haulage, and progress being made in continuous mining.

Mines, Companies

Sale of the Buckeye Coal & Coke Co. has been announced.

The purchaser is Page Coal & Coke Co. of Bluefield, W. Va. The amount involved in the transaction was not revealed. Buckeye Coal Co., located in Wyoming County, W. Va., was the fifth mine to be opened in the Pocahontas coal field.

Black Star Coal Corp., of Louisville Ky., which has one mine and a nationwide sales organization, has been bought for $2,576,000 million by Lee Coal Co., Jasper, Ala.

Lee Coal Co. has extensive coal lands in Alabama and several mines there but reportedly had a small sales organization and bought Black Star primarily for this reason.

Lehigh Valley Coal Corp. has purchased a 200-employee plant in Brooklyn, N.Y., which makes directional signals for automobiles.

Lehigh Valley made its initial diversification move in 1957 when they acquired the Steadle Co., Carthage Mo, manufacturers of springs for beds and other furniture. There is no indication that the newly bought Brooklyn plant will be moved from that location.

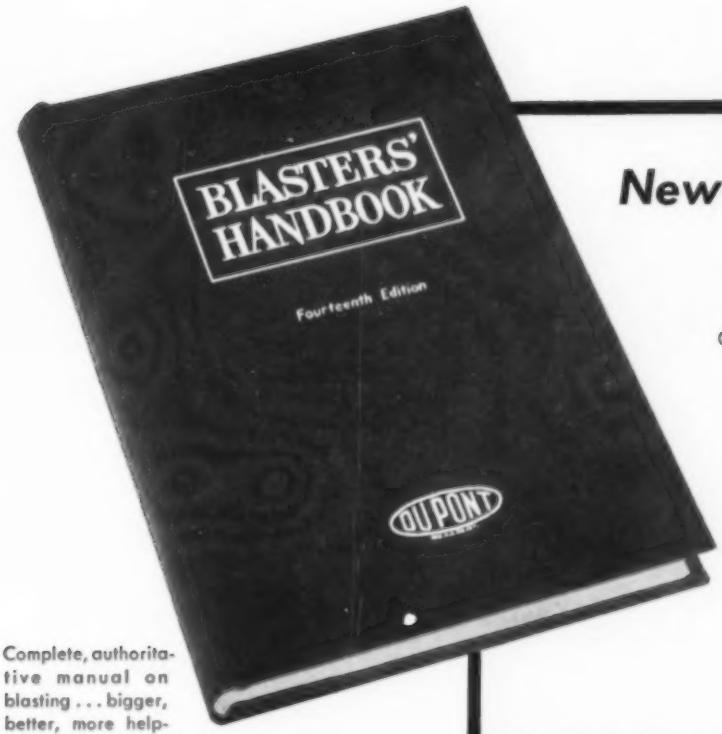
A $200,000 expansion program of the firm's coal processing plant at Quealy, six miles south of Rock Springs, Wyo., has been announced by Gunn-Quealy Coal Co.

The expansion includes installation of a new machine for air-washing of coal and addition of capacity on the coal re-screening plant.

Peabody Coal Co. expects to move into its new office building in downtown St. Louis in March, consolidating its corporate headquarters.

By late fall, Peabody expects to start coal production at a mine east of

(Continued on p 61)



Complete, authoritative manual on blasting . . . bigger, better, more helpful than ever before.

New 14th edition
BLASTERS' HANDBOOK

Contains 30 information-packed chapters
(Partial list of subjects)

- Dynamite
- Blasting Agents
- Primers and priming
- Firing with safety fuse
- Firing electrically
- Firing with "Primacord"
- Cuts and rounds
- Tunnels and shafts
- Coal mines
- Ore mines
- Quarries and open pits
- Strip mining of coal
- Construction
- Safety measures

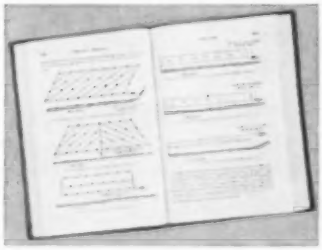
ONLY $1.75 per copy

Now off the press!

ANSWERS YOUR QUESTIONS • Here's your complete manual of blasting—containing full information on every subject from electrical firing to submarine blasting.

Hundreds of clear "how-to" pictures, diagrams, charts and tables help you improve your blasting technique according to approved methods.

And the officially approved Institute check list of "Do's and Don't's" helps you provide maximum safety on the job. Your "Blasters' Handbook" can go right on the job with you. It has a durable "Fabrikoid" cover, and is indexed for easy reference.



READY FOR YOU NOW • The 14th edition of the "Blasters' Handbook" is off the press *now*. Blasters everywhere will want a copy of this ready reference book . . . to solve blasting problems and help them do a better job at lower cost.

Order your copy *now*. Mail the coupon and your check for $1.75 today.

DU PONT EXPLOSIVES

Blasting Supplies and Accessories

DU PONT

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

. . . ORDER NOW

E. I. DU PONT DE NEMOURS & CO. (INC.)
Explosives Department
2543-A Nemours Building
Wilmington 98, Delaware

Gentlemen:

Please send a copy of the "Blasters' Handbook," for which I enclose check for $1.75. (Plus sales tax where applicable)

Name .....

Street .....

City ..... Zone ..... State .....

STOCKPILING COAL for the William Aloe Coal Co., this 1¼-yd. shovel gets its power from a Cat D8800 Engine. A D13000 powers a 1½-yd. shovel, also stockpiling coal.

LOADING OUT COAL in the operation of the William Aloe Coal Co., this 2½-yd. shovel is powered by a Caterpillar D337 (Series F) Turbocharged Engine.

Standardize on CAT Diesel power for the tough mining jobs

A. J. Schmidt, Purchasing Agent of the William Aloe Coal Co. at Imperial, Pa., now relies on Caterpillar for 100% of his engine power requirements in coal loading operations

That's a sound move for *any* mine. When you're powered 100% with Cat Diesels, you're sure of dependable performance in *every* phase of your engine power requirements. Their reliability has been a by-word on punishing applications for more than 25 years, because they were built for the hard work. Today, as a result of constant development, these modern heavy-duty units are tougher and more efficient than ever.

One of the big reasons for the complete acceptance of the Caterpillar Engine is the fuel injection system. Here's how it provides profitable production:

1. Maintains loads for long periods without power drop.
2. Idles smoothly and runs steadily on all cylinders.
3. Handles variable loads with quick response.
4. Burns a wide variety of low-cost fuels without added maintenance costs.
5. Is free from frequent checks and adjustments.

For complete information about Cat Engines and Electric Sets, see your Caterpillar Dealer. He knows power requirements from shovels to tipples. He backs you around the clock with fast, efficient service and high-quality factory parts. For original or replacement power—for honestly rated, certified power—give him a call!

Engine Division, Caterpillar Tractor Co., Peoria, Ill., U.S.A.

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

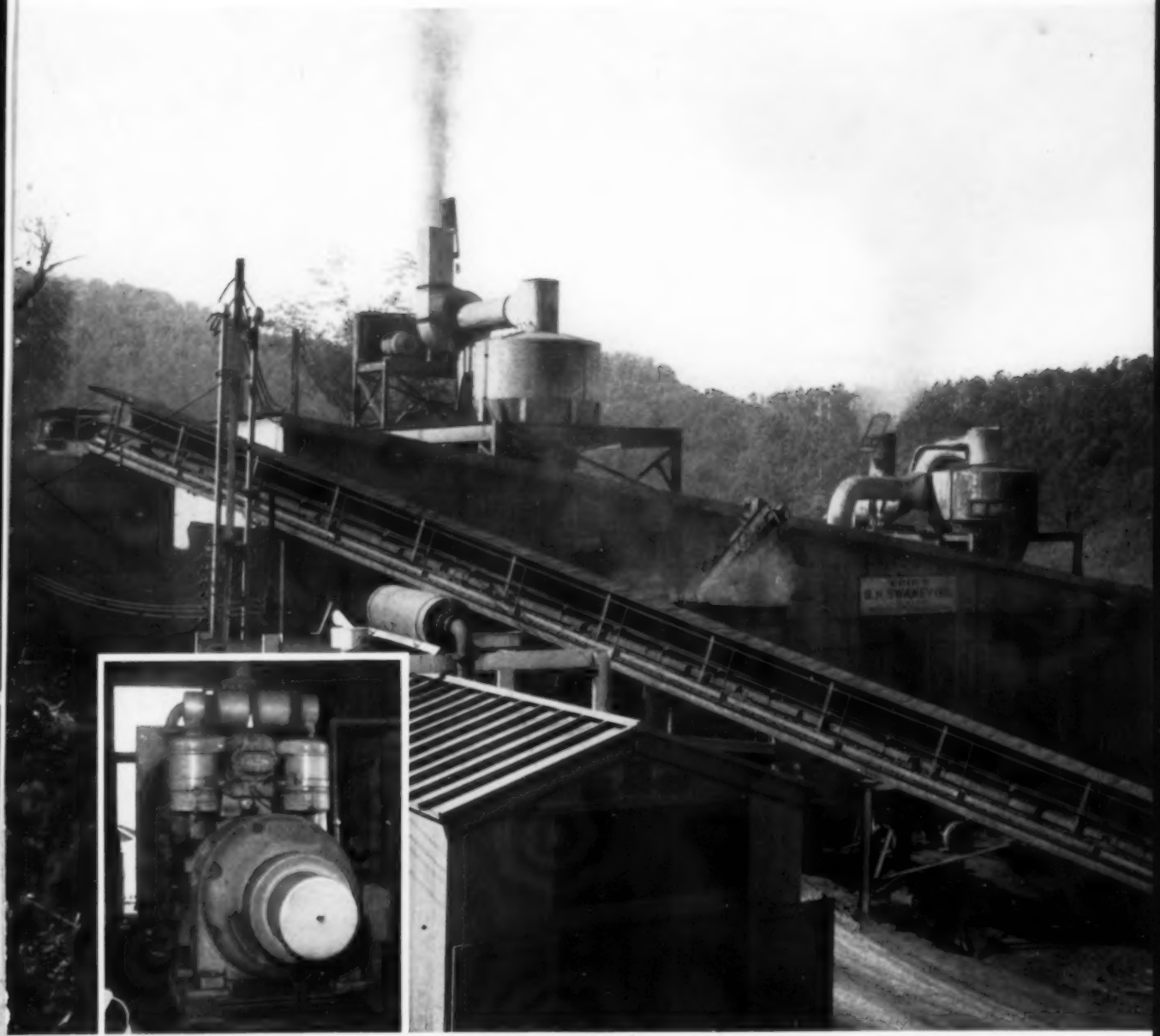
CAT INDUSTRIAL ENGINES 10 sizes up to 650 HP (maximum output capacity). Most leading manufacturers can furnish machines with Cat Engines on request.

CAT ELECTRIC SETS 12 sets up to 350 KW (continuous duty) with the Cat Generator. All Cat Electric Sets and Engines come with a notarized certificate of capacity.

ELECTRICAL POWER for exhaust fan, pin timbering machine, shop cutting machine, loader, conveyor to tipple, grinder and lights at Overfield, West Va., is furnished by a D337 Turbocharged Electric Set. Production: 300 tons a day. Owner: R. & L. Coal Co.

STRIPPING OVERBURDEN from coal, this shovel with 5½-yd. bucket maintains profitable production powered by a Cat D397 (Series D) Turbocharged Engine. Owner: Keeley Construction Co., Clarksburg, West Virginia.

BY CATERPILLAR



FURNISHING POWER FOR THE ENTIRE TIPPLE, this Cat D397 Electric Set often starts Monday morning and doesn't shut down until Saturday night. Tipple consists of 2 crushers, 3 vibrators, 10 flight conveyors, furnace, air cleaner and washer. Production: 1,500 tons a day. Owner B. H. Swaney, Inc., Charlesburg, West Virginia.

Dept. CA2, Engine Division
CATERPILLAR TRACTOR CO., Peoria, Illinois, U. S. A.

Send me more information about Caterpillar Diesel Engines. I have checked the proper box to guide your selection of material.

- ☐ I would like detailed information, as I may be in the market for a Cat Diesel Engine or Electric Set. I understand that I am under no obligation.
- ☐ I am interested in learning more about these engines.

Name _____

Company _____

Address _____

City _____ *Zone* _____ *State* _____

These High Strength Steel trailers were built by the Marion Metal Products Company, Marion, Ohio. Use of 12-gage **USS Cor-Ten** Steel, instead of 10-gage carbon steel, reduced weight 23%.

High Strength Steel trailers increase payloads 50%

at Saxton Coal Corporation, Petersburg, Indiana

When Saxton Coal Corporation moved their strip mine location, the dump trucks had to travel twice as far to unload at the transfer tipple. To maintain their daily loading schedule they had to build a bigger fleet, or increase the payload of the trucks they were using—without going over the legal weight limit. Part of the route was on state highways.

They decided against more trucks and additional operating expenses, and solved their problem by purchasing High Strength Steel trailers that could be handled by their present tractors. "We increased the payload of each truck more than 50%," says General Manager Darwin C. Youngs, "and we haven't exceeded the legal weight limit on the roads we travel."

Payload is increased with High Strength Steel construction because High Strength Steel is much stronger than carbon steel. Trucks and trailers can be made lighter, and *the weight saved goes into the load instead of the carrier.*

High Strength Steel has greater resistance to atmospheric corrosion, impact and wear than structural carbon steel. It needs less maintenance and it lasts much longer.

United States Steel produces three brands of High Strength Steel—COR-TEN, MAN-TEN and TRI-TEN. Each has its own characteristics that make it ideal for certain applications in trucks and trailers. USS "T-1" Constructional Alloy and USS Stainless Steels are also available. If you want more information about how these steels can help your trucking operations, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS HIGH STRENGTH STEELS

USS COR-TEN, MAN-TEN, TRI-TEN

USS, COR-TEN, MAN-TEN, TRI-TEN and "T-1" are registered trademarks of United States Steel

UNITED STATES STEEL

Mines, Companies *(Continued)*

Evansville, Ind., to supply up to 1,200,000 tons annually to Aluminum Co. of America for generation of electricity at its new smelter in Yankeetown, Ind.

Accidents

Charles C. Balser, superintendent of stripping operations at the Old Homestead Mine near Nortonville, Ky., died from injuries suffered at the mine.

He reportedly was struck by rock and dirt falling from a power-shovel bucket as the shovel was being moved from one location to another.

Eleven miners were killed when a gas explosion trapped 25 men below ground in a mine straddling the Virginia-West Virginia border.

This was the second disastrous explosion in one of Pocahontas Fuel Co.'s mines in the border coalfields in 11 mo. It occured in mine No. 31 which was rated by state and federal mine officials as gaseous.

The year 1957 was the first in the history of the Colorado coal mining industry in which there were no fatalities in the mines, it was recently announced.

Until 1957 there had been an average of 47 deaths in the mines over the 74-yr history of mining in the state. Officials say that better safety methods, better inspection and the cooperation of all the people in the industry, including labor, accounted for the fine record.

Utilization

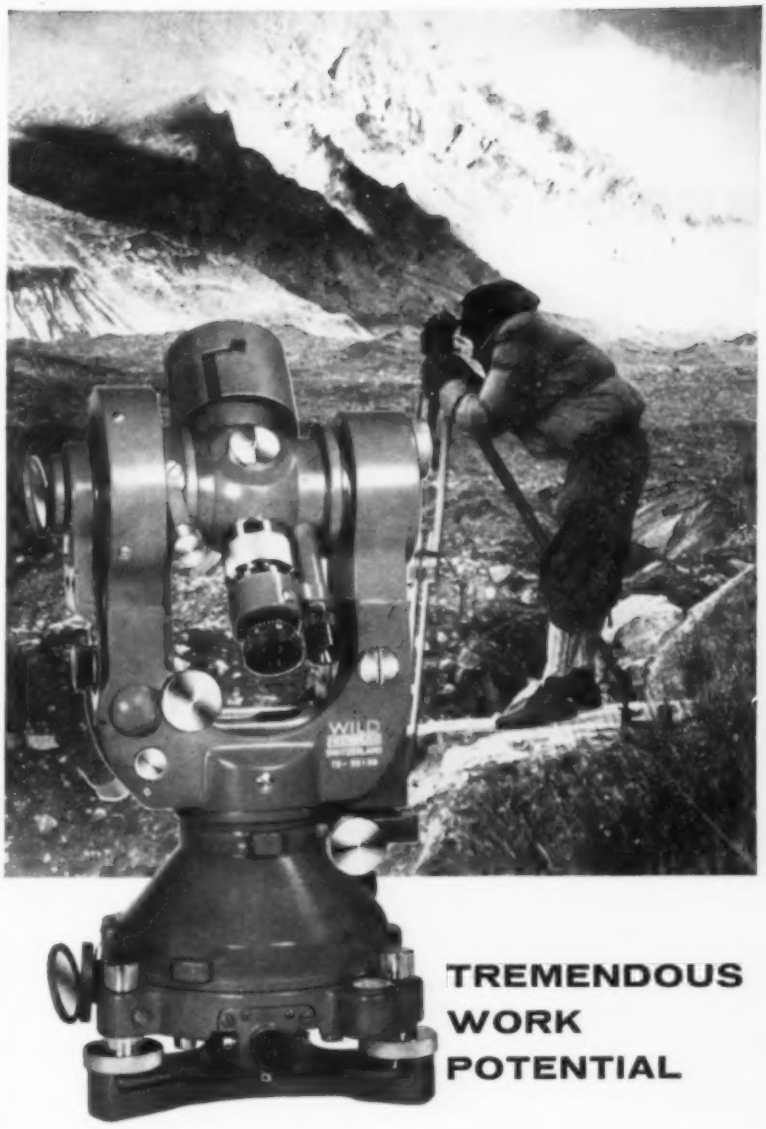
Plans to build a coal-burning steam-generating plant near Kemmerer, Wyo., have been confirmed by Utah Power & Light Co.

It is understood that there are many legal problems to work out such as land use, water rights, etc. Sources report that Kemmerer Coal Co. will probably supply the plant with fuel when it goes into operation.

Rising sales in 1958 are predicted by leading manufacturers of automatic anthracite equipment for commercial space heating.

These predictions are contrary to trends in sales of most types of heating equipment and are based mainly on steady increase in sales of the relatively new, completely automatic, water-cooled grates. Such grates are finding use in commercial and school buildings with most reports indicating unusual economy.

(Continued on p 64)



TREMENDOUS WORK POTENTIAL

T-2 UNIVERSAL THEODOLITE

The Wild T-2 enables the operator to work rapidly, precisely and steadily under conditions that may range from equatorial to antarctic.

Optical and mechanical excellence, plus negligible maintenance requirements, combine with a complete list of accessories to make the T-2 the finest instrument in its class by far.

Write or phone for Booklet T-2 for complete data.

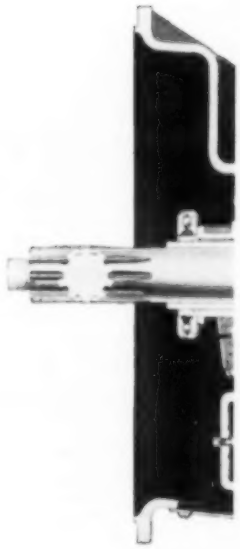
Full Factory Services

WILD HEERBRUGG INSTRUMENTS, INC.

MAIN AT COVERT STREET, PORT WASHINGTON, NEW YORK • PORT WASHINGTON 7-4843

announcing the R-1550 ROADRANGER®

...for off-highway service with the *LARGEST automotive diesel engines built!*



This NEW ROADRANGER® is the *largest* heavy-duty *semi-automatic* transmission designed specifically for big earthmoving, mining and quarrying equipment where *maximum capacity* and *long wear life* are essential.

The model R-1550 offers 9 forward ratios and 2 reverse ratios all controlled with *one gear shift lever*. This transmission with overdrive in ninth has short, even steps between gear ratios which average 38%.

The model R-1550 is designed for diesel engines in the 1550 cu. in. class developing up to 600 hp.

Specify the brand new R-1550 Fuller Semi-Automatic ROADRANGER Transmission by name. Assure faster work cycles, lower fuel consumption, longer engine life, less operator fatigue . . . greater profits. Check with your equipment dealer for the most efficient, easiest shifting Fuller Transmission to meet your specific operating requirements.

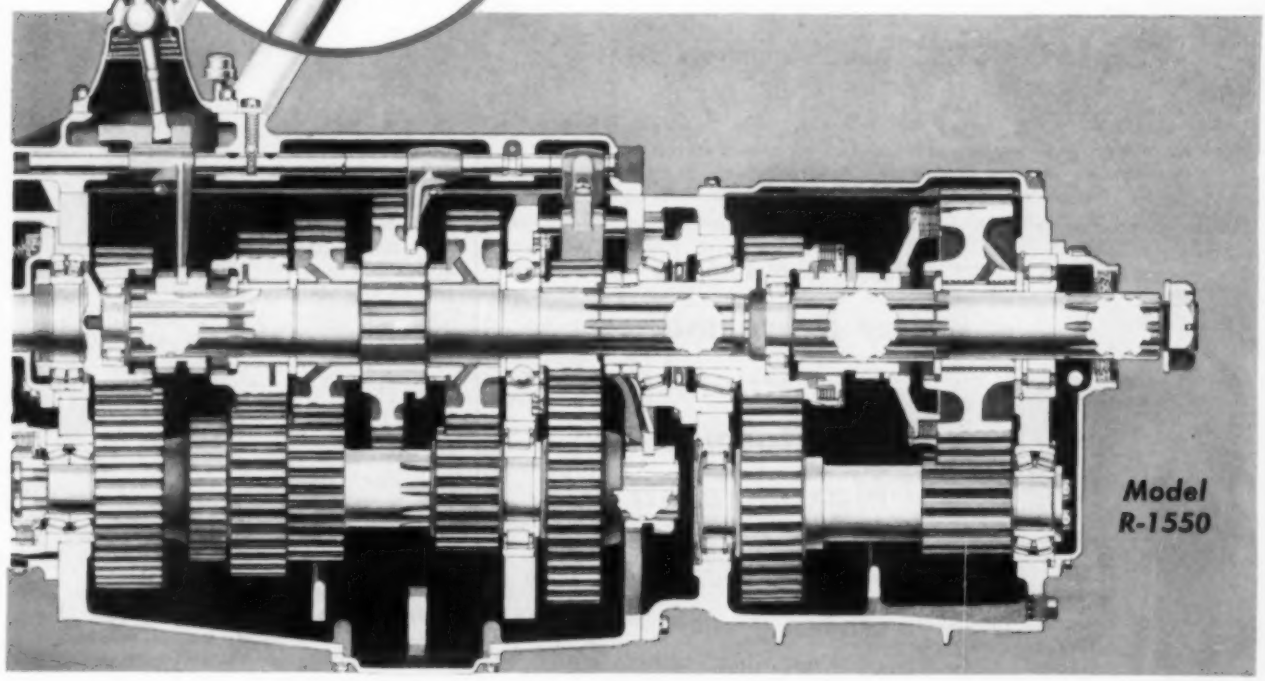
NEW... AIR POWERED COUNTERSHAFT INERTIA BRAKE

This simple button, provides for quick up-shifts without double clutching. By simply pushing this button before each up shift, the countershaft inertia brake is activated when the transmission is in neutral, allowing for immediate engagement of the next higher gear ratio.

Fuller TRANSMISSIONS®

FULLER MANUFACTURING COMPANY • *Transmission Division, Kalamazoo, Mich.*

TRANSMISSION



R-1550 Transmission

9 forward ratios

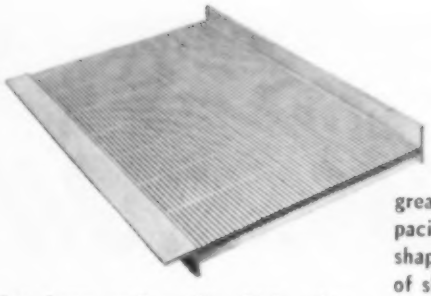
2 reverse ratios

1 gear shift lever

Short, even steps between gear ratios which average 38%

GEAR	RATIOS	% STEP	
Ninth	.69	44.93	High Range
Eighth	1.00	40.0	
Seventh	1.40	40.0	
Sixth	1.96	33.7	
Fifth	2.62		
	RANGE SHIFT	34.7	
Fourth	3.53	39.94	Low Range
Third	4.94	39.88	
Second	6.91	38.35	
First	9.56		
Reverse	2.71	High Range	
Reverse	9.56	Low Range	

GIVES COAL A REAL CLEAN SCREEN!



You keep coal quality high when you give it a Hendrick Wedge Slot screening! Hendrick Wedge Slot has the kind of small openings that assure fine screening yet affords far greater draining and screening capacity. Profile bars are "precision shaped" to maintain uniform width of slot openings the entire length of the screen as wear progresses. For details on the Hendrick Wedge Slot Screen best suited to afford long life under your specific operating conditions, write Hendrick today.

Hendrick MANUFACTURING COMPANY
41 DUNDAFF STREET, CARBONDALE, PA.

Perforated Metal • Perforated Metal Screens • Wedge-Slot Screens • Hendrick Wedge Wire Screens • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids • Hydro Dehazers • Petrochemical Column Internals

Low Grinding Costs
Better Performance
Fast Production
Uniform Results
Maximum Bit Life

These are a few of the many advantages you get when you grind your bits automatically on the FAIRVIEW BIT GRINDER.

All of these advantages boil down to savings of both labor and wheels, productivity of 250 to 350 per hour, correct angles—smooth finish, more regrinds, more grinds per bit, more tons per grind and elimination of hazardous operation. It's to your advantage to use the FAIRVIEW BIT GRINDER both in the satisfactory grinding results obtained and in the protection of your investment in expensive equipment.

WRITE TODAY for fully descriptive bulletin!

FAIRVIEW BIT COMPANY
FAIRVIEW, WEST VIRGINIA

Utilization *(Continued)*

Electric Furnace-Man, Inc., reports that its backlog of orders is at its highest.

Navajo coal may be used to provide power for large sections of New Mexico and Arizona, according to sources in that region.

Three major firms are said to be studying the feasibility of erecting a large steam generating plant in San Juan County, N.M., to supply the power. A Utah firm, from which the report comes, has a lease on Navajo coal reserves near Fruitland, N.M.

A special report on school heating has been prepared by the Anthracite Information Bureau, based on a survey of representative New York State School Board members.

The report, showing that members considered custodial and maintenance costs more important than any other considerations, also noted that new anthracite equipment has, in the past three years, developed performance records which show radical reductions in labor and maintenance costs.

Labor and Coal

The Kentucky Truck Coal Operators Association, a group of small-mine operators, is fighting against hearings on proposed revision of minimum wages paid to bituminous coal miners.

An indeterminate raise was asked by the United Mine Workers union, and the Pocahontas Fuel Co. and the Pittsburgh Consolidation Coal Co.

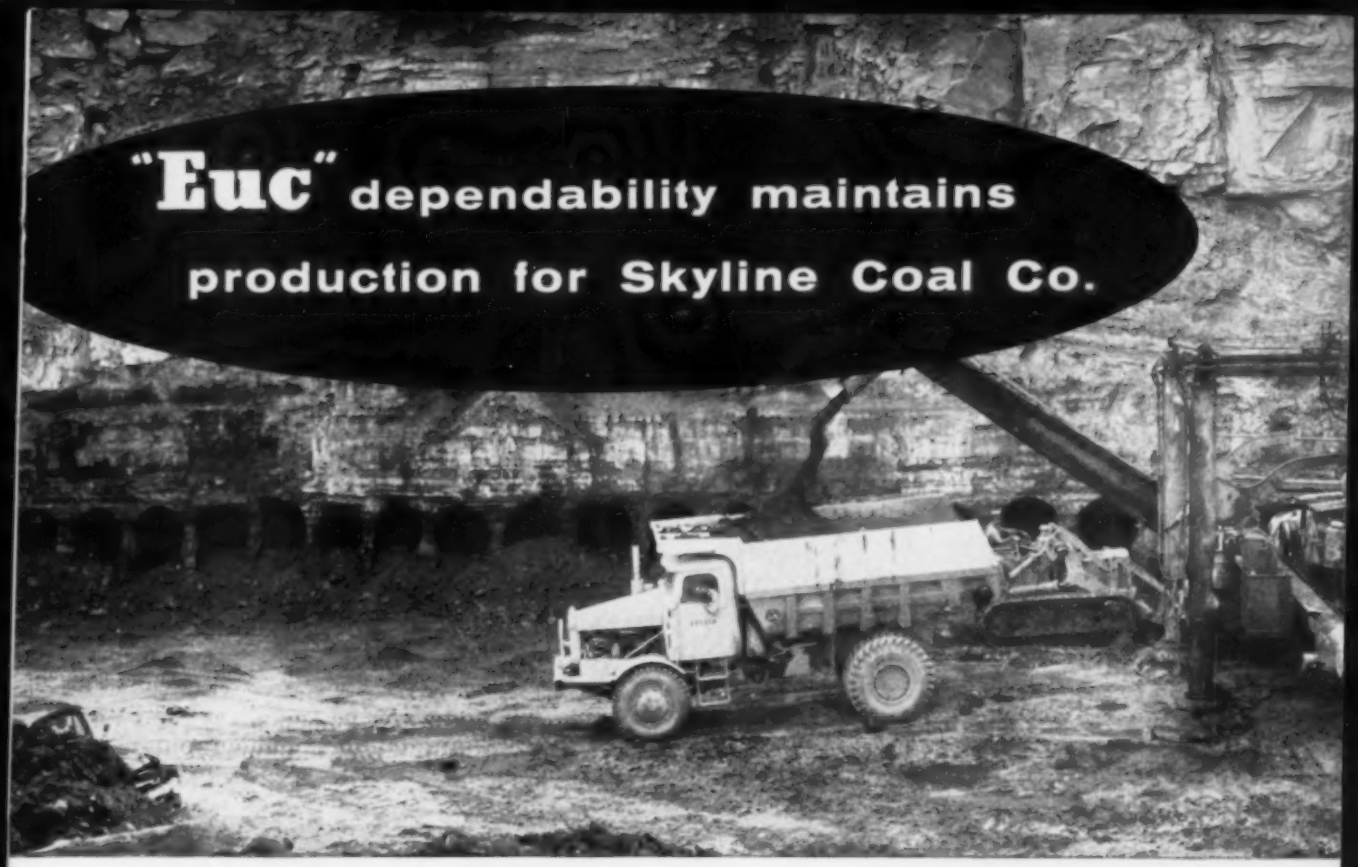
Suit has been filed by John L. Lewis for the United Mine Workers against three East Tennessee Coal companies who allegedly owe $67,912 to the UMW.

As trustee for UMW welfare funds, Lewis said that the companies have not complied fully with the national bituminous coal wage agreement in 1950, in which they agreed to pay 40c to the welfare fund on every ton of coal mined. The firms are Phillips Brothers Coal Co., Stansberry Coal Co. and Fesler Coal Co.

Joe McQuade, president of the Central West Virginia Operator's Association has said that the proposed mining code now before the West Virginia legislature is a plan by big operators and the UMW to drive small coal mines out of business.

Claiming that it is unlikely that any representative of the small operators or their employees will ever be appointed to the boards proposed in the code, he asked that small mines be given assurance that their interests will be protected.

"Euc" dependability maintains production for Skyline Coal Co.



Powered by a 218 h.p. diesel driving through a five-speed transmission and the Euclid performance-proved planetary drive axle, the Model R-18 has a top speed of 27 mph with full payload.

In Evanston, Kentucky, the Skyline Coal Company is producing 2000 tons of coal daily from an abandoned strip mine. Secret of their achievement is the auger method of mining—and reliable hauling equipment!

The coal is loaded directly into the waiting Rear-Dump haulers . . . three Model R-18 Euclids. With a narrow pit, the easy maneuverability of the "Eucs" enables drivers to spot the Rear-Dumps under the loader without delay. The "Eucs" haul the coal 1¼ miles to a head-house where it is dumped and stockpiled for the preparation plant. At Skyline, as on many other mining operations, Euclids have proved their dependability for low-cost production around the clock.

Whether they're hauling coal or overburden . . . on long or short hauls . . . "Eucs" move more loads at lower cost per ton. It will pay you to have your Euclid dealer give you facts and figures on the complete line of Euclid equipment. He'll be glad to show you why ***Euclids are your best investment.***

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

Raymond E. Salvati (Island Creek Fuel and Transportation Co.). This 2560 hp towboat regularly tows 20 fully loaded coal barges upstream on the Ohio River.

How to move a mountain of coal—economically

Coal is essential to steel production. Every day huge quantities of it are converted into coke for use in blast furnaces. Maintaining adequate supplies is a big transportation job, where small savings on every ton multiply into impressive totals.

Designed especially for this type of work, modern river towboats and large-capacity barge fleets provide low cost freight service over the inland waterways system. Vessels like Island Creek Fuel and Transportation Company's *Raymond E. Salvati,* above, deliver up to 18,000 tons of coal per trip. Such Dravo-built towboats are products of many years of research, studies in actual service and scientific model basin testing. Engineered for low operating costs, they produce benefits for consumer *and* transporter.

Experience in constructing more than 3,700 hulls enables Dravo to build this kind of performance into many types of floating equipment. For more information on any of the products and services listed below, write to DRAVO CORPORATION, PITTSBURGH 25, PA.

DRAVO
CORPORATION

Blast furnace blowers • boiler and power plants • bridge sub-structures • cab conditioners • docks and unloaders • dredging • fabricated piping foundations • gantry and floating cranes • gas and oil pumping stations • locks and dams • ore and coal bridges • process equipment • pumphouses and intakes • river sand and gravel • sintering plants • slopes, shafts, tunnels • space heaters • steel grating • towboats, barges, river transportation

FOR MOVING EARTH, ROCK, COAL AND ORE

The 1650-B STANDS OUT
by every standard of comparison

Use any yardstick you wish to measure the worth of a stripping shovel — range, speed, ease of control, durability, low maintenance, or that all-important factor: steady, big-output performance. You'll find that the Bucyrus-Erie 1650-B stripping shovel is outstanding by every standard of comparison.

The 1650-B is available with 40 to 65-cu. yd. dippers, with dumping reach ranging from 178 to 135 feet. The machine illustrated here has a 55-cu. yd. dipper and a dumping radius of 147½ feet.

Big and rugged, the 1650-B is built in the finest Bucyrus-Erie tradition — backed by unequalled experience in building excavating machinery for use all over the world.

Check into the economical advantages of Bucyrus-Eries. A complete line of stripping shovels and walking draglines from 2½ to 65 cu. yd. capacities provides an excavator to fit any mining job. 130L57C

A Familiar Sign . . . BUCYRUS ERIE *. . . at Scenes of Progress*

BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN

We have reserved a copy of our new 24-page **CATALOG** for **YOU!**

Fill in and mail the coupon below today!

Contains complete data concerning construction and application of ABC Mine Ventilation Flexible Tubing — both NEOLON and MineVent. Pictures methods of coupling and hanging sections of tubing. Gives friction loss charts and helpful hints for getting a longer service life from tubing. Shows typical mine layouts. Also describes ABC Mine Brattice Cloth, ABC Powder Bags and other products. Yours for the asking.

Gentlemen: Please send catalog 158

NAME_____

TITLE_____

FIRM_____

ADDRESS_____

CITY_____

STATE_____

A B C AMERICAN BRATTICE CLOTH CORP.

200 So. Buffalo St., Warsaw, Indiana

Current Coal Patents

By: Oliver S. North

Means for separating particles suspended in liquid, E. P. Austin and H. McCallum (assigned to Simon-Carves Ltd., Stockport, Cheshire, England), Dec. 17, 1957. Apparatus for separating non-magnetizable from magnetizable particles in a medium which has been used in a sink-float coal washing operation. The magnetizable material is magnetized so that it agglomerates and sinks, while the non-magnetizable particles are carried out in overflow liquid. Magnetizable fraction is recovered and passed through a demagnetizer to regenerate it for re-use. No. 2,816,657.

Hydraulic pit props, W. Löbbe (by A. B. Löbbe, Oberaden, Germany, as administrator of estate), Dec. 17, 1957. Improved hydraulic props for supporting mine roofs. Means are provided for maintaining substantially equal placing pressure of all individual props in a sequence. Props can be quickly placed and so regulated that deformation or destruction of props is avoided. Each prop is provided with an excess pressure relief valve in addition to the usual check valve. No. 2,816,728.

Cable pull for self-propelled longwall miner, C. F. Ball (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Dec. 17, 1957. Improved supplemental propelling and guiding means for a continuous miner which also serves to counteract thrust of the disintegrating head. The cable pull assist includes a winch or hoist in advance of the miner and an operable cable which is wound onto a drum to exert constant forward pull on the miner as it advances along the longwall face. No. 2,816,747.

Adjusting the viscosity of heavy-material suspensions in the dressing of ores, R. Teuteberg (assigned to SKB Schuchtermann & Kremer-Baum Aktiengesellschaft fuer Aufbereitung, Dortmund, Germany), Dec. 24, 1957. System and method for maintaining the desired viscosity of heavy-material suspensions used in sink-float separation of coal from waste, minerals from ores, etc. The liquid is subjected to a centrifugal force to divide it into two partial streams, one containing largely the coarse particles and the other the fine-grained, viscosity-increasing components. The specific weight of the latter partial stream fluctuates as the viscosity of the liquid varies, and the system here disclosed utilizes these fluctuations for regulation of the viscosity of the heavy liquid. No. 2,817,439.

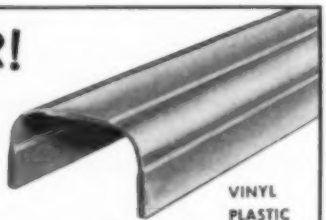
Process for separating mixture of solid particles into fractions by means of a hydroclone, J. N. J. Leeman and F. J. Fontein (assigned to Stamicarbon N. V., Heerlen, Netherlands), Dec. 24, 1957. Method of operating a hydroclone wherein relatively low pressure is required to ecomplish satisfactory washing and sharp classification of coal. Apparatus is mounted so that its axis makes a considerable angle with the vertical. Hydroclone is gravity fed from a wash box, without use being made of a pump. No. 2,817,441.

Mine escape tunnel, W. M. Inman, Dec. 24, 1957. Structure for a mine escape tunnel which is sealed with a fluid-proof, explosion-proof door and which will adequately protect miners during fires, explosion and cave-ins. Steps leading from working to tunnel are integrally formed as part of the reinforced concrete liner of the chamber and connecting passageway. Tunnel is connected to a mine shaft having means for supplying air and water to trapped men. No. 2,817,505.

BRIGHT Yellow COLOR!

Guyan

VISI-GARD



VINYL PLASTIC

Will Not Support Flame

The Trolley Guard with BUILT-IN Safety!

SHAPED RIGHT TO HANG RIGHT. Write for literature.

GUYAN MACHINERY CO. LOGAN, WEST VIRGINIA

Why scrap flights?

With Whitney Loader Chain, you can salvage expensive flights for *additional* service . . . save money ordinarily thrown away with worn out chain! Here's why—Whitney's exclusive *detachable* flight design features threaded stud ends with self-sealing lock nuts for quick, easy assembly or disassembly. Tapered studs anchor flights as solidly as one unit for dependable service life.

Further Whitney Mine Chain cost-saving advantages are:

- **SOLID STUD BUSHINGS** — self-cleaning design eliminates stiff joints — provides greater chain pin support by extra rigid design, thus reducing breakage.
- **FORGED STEEL FLIGHT AND UNIVERSAL JOINTS** — 100% Magna-Fluxed and Mar-Tempered.
- **EXCLUSIVE MINE CHAIN ASSEMBLY** for fast, easy maintenance at the face, in the shop or storeroom.

Whitney manufactures the entire product, both chain and flights, to assure completely balanced design, and fast, complete customer service. Whitney distributors, located in all mining areas, carry full stocks of mine chain and American Standard power transmission and conveyor chain. Field engineers always available. Catalogs on request.

Whitney

. CHAIN COMPANY

311A Hamilton St., Hartford 2, Conn.

ROLLER CHAIN • CONVEYOR CHAIN • SPROCKETS • FLEXIBLE COUPLINGS • WHITNEY-TORMAG DRIVES

Continental Conveyors *in action . . .*

Part of the 2.3-mile run, moving raw coal to Preparation Plant.

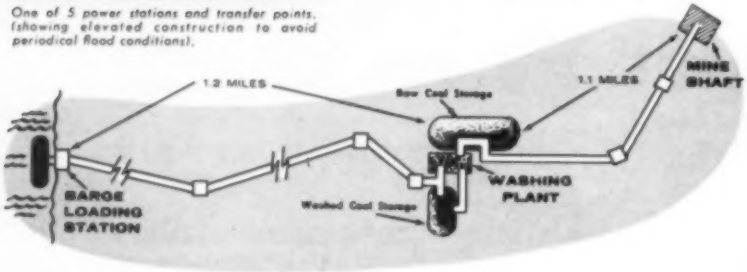
One of 5 power stations and transfer points. (showing elevated construction to avoid periodical flood conditions).

—at

DE KOVEN MINE

PITTSBURG AND MIDWAY COAL MINING COMPANY

Sturgis, Kentucky



From mine shaft, over 1.1 miles of belt conveyor to storage, washing, storage and reclaim, over 1.2 miles to river loading station . . . over rugged terrain, up and down hill, across low areas . . . DeKoven Coal travels the Continental Road: 500 tons per hour at 500 feet per minute on 36″ belt. 900 tons per hour at 580 feet per minute on 42″ belt.

We'll be glad to assist you with your conveying problems. Call, wire or write your nearest Continental office.

CGC

INDUSTRIAL DIVISION

Continental Gin Company

BIRMINGHAM, ALABAMA

ATLANTA · DALLAS · KNOXVILLE · MEMPHIS · MOBILE · NEW YORK 17

Patents (*Continued*)

Mining conveyors, G. Dommann, Dec. 31, 1957. Improved construction for double-chain mining conveyor. Unequal trough wear is prevented by providing a conveyor bottom having a thickened portion on its lower side above the chain return where it is joined to the conveyor bottom portion. No. 2,818,164.

Mine truck, J. C. Cooley, Dec. 31, 1957. Mine truck adapted for hauling heavy loads over uneven ground comprises a tractor section pivotally connected to a trailer section in such manner as to permit turning of the sections relative to one another about the longitudinal axis of the vehicle. Loading ramp automatically moves down into loading position when the trailer is empty. No. 2,818,187.

Boring type mining machine having three boring heads, L. D. Hagenbook (assigned to Goodman Mfg. Co., Chicago, Ill.), Dec. 31, 1957. Improved mining machine having a pair of laterally spaced boring heads and an intermediate, overlapping boring head. Latter has cutter arms of substantially different lengths. Form and arrangement of boring heads are especially adapted for relatively wide-low-height machines. No. 2,818,241.

Mining machine of the boring type having two boring heads, H. E. Smith (assigned to Goodman Mfg. Co., Chicago, Ill.), Dec. 31, 1957. Twin bore mining machine in which each of the overlapping boring heads has a relatively long and a short arm. Short arms are disposed at such angle with respect to long arms as to avoid mutual interference even though kerfs cut by the arms intersect. Ends of long arms have an improved form and arrangement of scoops. No. 2,818,242.

Continuous mining apparatus of the pivoted cutter bar type, S. Leven (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Dec. 31, 1957. Continuous mining machine having improved disintegrating, gathering and conveying means. Disintegrator head and its driving motors are mounted to move rectilinearly back and forth in vertical planes. Over-all structure can be made extremely low and compact. No. 2,818,243.

Briquetting of solid combustibles, F. Eisenhut, V. Gobiet and A. Siegl (assigned to Gelsenkirchener Bergwerks Aktiengesellschaft, Essen, Germany), Jan. 7, 1958. In the manufacture of an air-dried fuel briquette, ground coal is mixed with an aqueous dispersion of a bitumen and washed kaolin. Shapes formed from the mixture are dried at room temperature. No. 2,819,155.

When you need a centrifugal dryer,
you want One Machine for the Entire Job

This Means a REINEVELD Fine Coal Dryer...

- The Reineveld has greater flexibility and accepts any particle size of feed **from 3/8" all the way down to 0"** without requiring prior classification or desliming.
- The superior construction of the Reineveld permits higher G's with resulting low cake moisture and greater capacity.
- An integral distributor accelerates the feed in the direction of rotation and reduces degradation.
- The sturdy Reineveld is designed to operate at maximum efficiency and maintains uniformity of operation, even with intermittent feed.
- All this plus the low first cost of the Reineveld adds up to making it the most efficient centrifuge operating consistently at lowest overall cost!

For complete details, consult with a Heyl & Patterson sales engineer.

Reinevelds are used by many of the leading coal companies. Among the six top-ranked coal producing groups, four are using a total of 47 REINEVELD FINE COAL DRYERS

GROUP OR COMPANY	1956 Tonnage	% Change 1955 to 1956
Pittsburgh Consolidation Group*	31,724,380[1]	+ 13.3
U. S. Steel (c)	22,889,712[10]	— 9.0
Peabody Group*	21,698,493[6]	+ 59.9
Island Creek*	14,782,405[4]	+ 44.9
Eastern Gas & Fuel*	10,472,274[3]	+ 12.5
Pittston Group*	10,391,461	+ 28.9
(c)	9,507,[illegible]	

Excerpt from Keystone Coal Buyers' Manual

Heyl & Patterson INC.

55 FORT PITT BLVD., PITTSBURGH 22, PA., COurt 1-0750

Easy mining not a prerequisite...

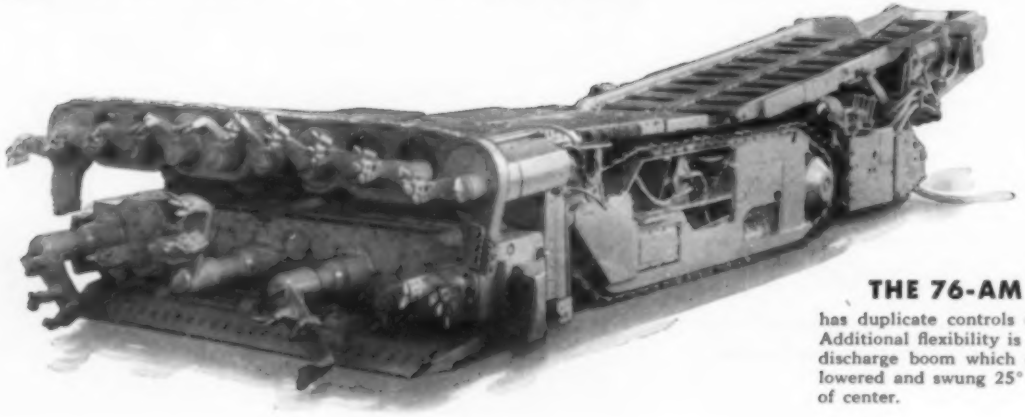
Record tonnages

are being mined

in such seams as No. 5 Indiana

and No. 8 Pittsburgh...

JEFFREY 76



THE 76-AM COLMOL
has duplicate controls on each side. Additional flexibility is provided by a discharge boom which can be raised, lowered and swung 25° to either side of center.

76-AM Colmol operating in 42" coal. Note clean roof, walls and floor. Operator is 20' from the face, working in a protected position.

COLMOL®

REMARKABLE PRODUCTION is being credited to the Colmol . . . average tonnages over a period of weeks of 550 per shift and peak tonnages in excess of 750 per shift.

The Colmol requires a minimum of maneuvering, helping to account for this highly efficient performance. It handles easily on its long, wide crawlers . . . can be turned in its own length . . . mines the coal without constant manipulation of controls.

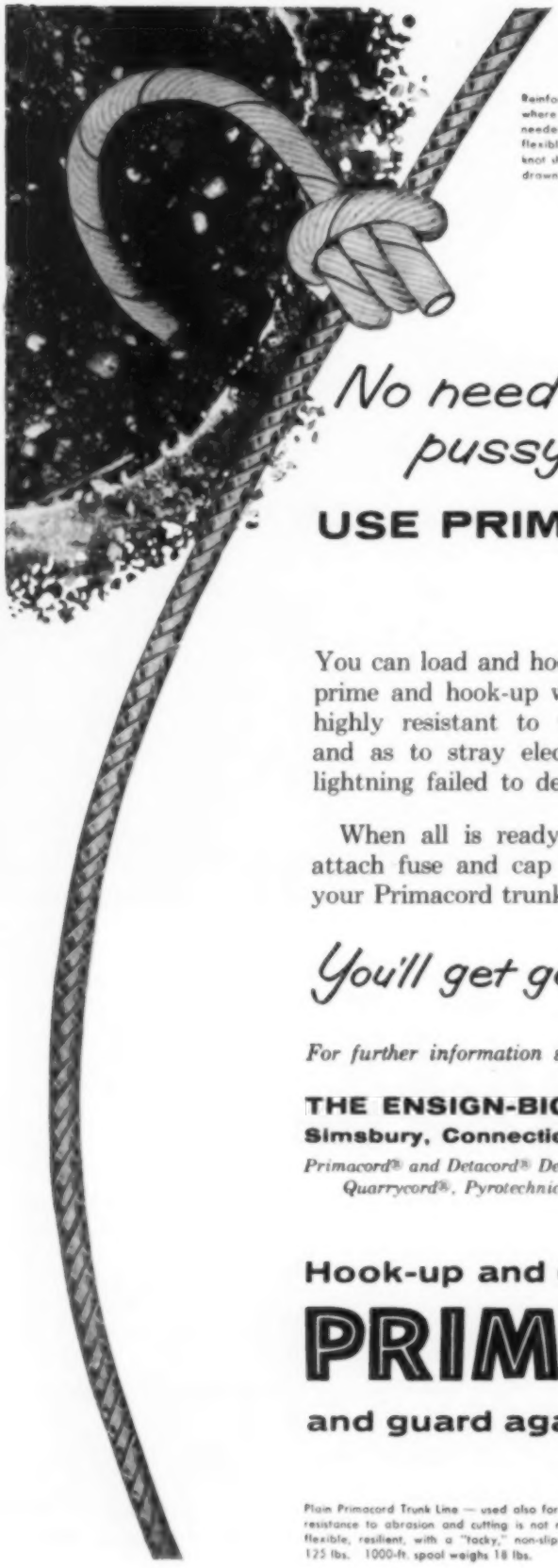
Coal is broken from the face, not ripped or ground off, resulting in favorable overall screen consist.

Designed for working in low veins, the 76-AM Colmol continuous mining machine is applicable to seams ranging from 38" to 54"; the 76-BM Colmol for medium-high seams up to 77"; and the 76-CM for high seams up to 96".

Jeffrey also makes the MOLVEYOR® for continuous transportation behind continuous mining machines, Loaders, Universal Cutters, Conveyors, Shuttle Cars, Face and Roof Drills, Locomotives, Fans and Blowers. For literature, write to The Jeffrey Manufacturing Company, Columbus 16, Ohio.

JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING



Reinforced Primacord Branch Line — recommended for deep holes where normal strength and resistance to abrasion and cutting are needed. Textile reinforced (yellow with red thread), tough, resilient, flexible. Tensile strength 160 lbs. 1000-ft spool weighs 19 lbs. The knot shown is the double-wrap half hitch, made in the branch line and drawn tightly around the trunk line.

No need to pussyfoot...

USE PRIMACORD

You can load and hook-up *well ahead* of the blast when you prime and hook-up with Primacord detonating fuse. It is highly resistant to vibration, friction, impact, sparks — and as to stray electrical currents, even a direct hit by lightning failed to detonate Primacord.

When all is ready for the blast — then and then only attach fuse and cap or electric blasting cap to the end of your Primacord trunk line.

You'll get good digging

For further information see your explosives supplier or write to

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut • Since 1836

Primacord® and Detacord® Detonating Fuse, Safety Fuse, Ignitacord®, Quarrycord®, Pyrotechnical Devices and Blasting Accessories

Hook-up and detonate with

PRIMACORD®

and guard against *Stray Current* hazards

Plain Primacord Trunk Line — used also for shallow holes — wherever resistance to abrasion and cutting is not required. Textile covered, flexible, resilient, with a "tacky," non-slip surface. Tensile strength 125 lbs. 1000-ft. spool weighs 18 lbs.

P-<

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

COAL AGE

FEBRUARY, 1958

IVAN A. GIVEN, EDITOR

Continued Progress

HOW TOUGH the sledding will be for business and industry in 1958—and in turn for coal—is still unknown. If the December bituminous rate of around 9 million tons a week should turn out to be the pattern for much of the year, it might be tough indeed—not only for coal but for everybody. The present view, however, is that an upturn is due not later than the second half of 1958. Depending upon the strength of that upturn, bituminous output could range anywhere from the 1957 level of 488 million tons or slightly lower up to more than the 1956 total of 501 million. Possibly the final result may be somewhere between, which still would make it a good year.

Anthracite in '58

Degree-day deficiency still is the big item in the anthracite picture. With 1957 again warmer than normal, hard-coal output again ran consistently under 1956 figures. However, as noted in the review material elsewhere in this issue, anthracite was helped by a high rate of exports and was able to develop additional industrial, commercial and institutional outlets. Consequently, it is logical to conclude that if business picks up and normal winter temperatures return, anthracite could do fairly well in 1958 while building up the newer industrial and commercial outlets throughout its market territory.

Necessary Skills

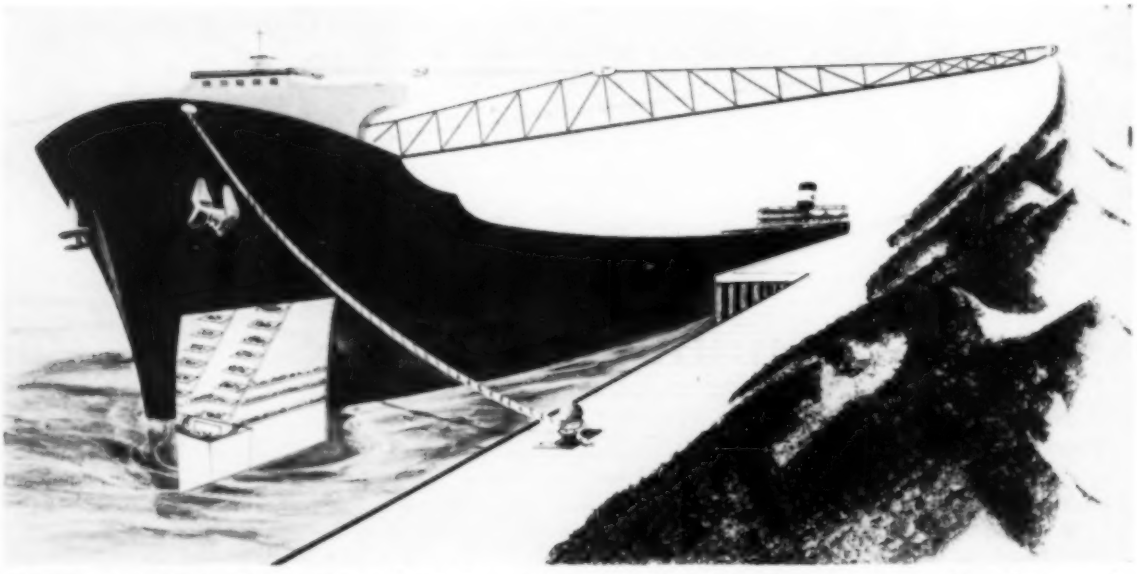
On any basis of measurement, however, anthracite and bituminous producers face a year of tougher going. Old problems will be bigger and new ones will come up. But coal has one big thing in its favor in meeting the 1958 situation. That big thing is the progress that has been achieved in the past few years on all fronts—production, preparation, safety, training, cost control, research, marketing, labor relations, public relations and so on. There is every reason to believe that additional advances will be achieved in 1958, especially since both management and men are working harder than ever to acquire the skills necessary to move ahead even under adverse conditions.

No Increase

A major element in the final 1958 results, as in the results of other years, will be the strength of competition. Oil and natural gas are still around and one of their ways of getting more business is taking it away from coal. This, however, is getting harder, and the successes are not as towering as they used to be. That situation could, of course, change, but there is no blinking the fact that oil and natural gas now find it more difficult to compete on price, while developments in coal-burning equipment are reducing the force of the convenience argument. Conclusion? In the absence of any basic change in pricing policies in the oil and natural-gas industries, coal will encounter no increase in competitive pressure in 1958. It might, in fact, find that the pressure was down from previous years and that the going was correspondingly easier.

Program for '58

Basically, 1958 poses coal with the problem of adjusting to conditions that may exist without sacrificing any of the gains of recent years. The big need is for a firm stand against price concessions that are not warranted by improvements in cost. After that, coal can benefit from continued pressure to cut cost, heighten quality and promote safety through modern methods and equipment, plus expanded research, improved merchandising and better service to the customer. Adherence to this program will insure that when 1958 is history coal can look back and mark it up as not a setback year but a time of continued progress toward a better future for the industry.



OVERSEAS EXPORTS—a key factor in offsetting domestic losses for coal in '57—will continue as major-league business. The 24,000-ton, self-discharging "super collier" above is one of three planned by the Pocahontas Steamship Co. (see "Export").

Feat in '57 and Goal for '58 . . . Strength in Adversity

Bituminous and anthracite have held to high-level output in spite of the economy's breathing spell. Once the spell is broken—perhaps during this year's second half—tonnage for both should move up.

STRENGTH IN ADVERSITY, demonstrated by bituminous and anthracite in 1957, will dominate the fortunes of both during the coming year.

Bituminous got off to a poor start with serious floods in some major producing areas and unexpected curtailment in purchases by electric utilities. Then, just as production had recovered to within 0.1% of the 1956 level (Aug. 17, 1957), the Nation's economy put on the brakes and brought about the now-well-publicized "dip," "breathing spell," or "leveling off" in general business activity.

These adverse factors notwithstanding, bituminous output—sustained primarily by utility, steel and export markets—ended up the year at about 488 million tons, down only 2.6% from a 1956 production of 501 million tons.

Anthracite—still primarily a space-heating fuel—suffered from an allergy to mild winters. A heating season of higher-than-normal temperatures in U. S. and Canadian markets accounted for most of the production drop from 28,100,000 tons to an estimated 25,200,000 tons.

In spite of this hardship, the anthracite record could have taken a much more serious turn if continued strength in overseas and industrial markets had not materialized.

The uncertainties of 1958 render the job of forecasting tonnages more precarious than ever. But the strength in adversity demonstrated by bituminous and anthracite in 1957 should pay off for both again during the coming year.

Anthracite fortunes are not likely to get worse since year-end production was already geared to the mild-winter retail level and heavy purchases by industrial and overseas customers showed no signs of abatement. Thus, hard coal should hold production to the 25- to 26-million mark, with better-than-fair prospects of a rebound to 28 million tons if a more severe heating season sets in.

If the Nation's economy fails to recover during the second half of 1958, bituminous output could drop to as low as 475 million tons. But, assuming the second-half pickup in general business activity expected by most economists, production might reach 503 million tons. Tonnages could thus break down as follows:

Millions of Tons	1958 Minimum*	1958 Maximum	1957
Electric utilities	164.6	170.0	158.5
Steel and chemicals	102.5	109.0	111.0
Industrial (inc. cement)	97.3	98.0	96.0
Retail	36.0	40.0	36.0
Railroad fuel	6.3	6.5	8.6
TOTAL U. S. CONSUMPTION	406.7	423.5	410.1
Canada	18.5	19.0	20.0
Overseas	50.0	60.0	58.0
PRODUCTION (cons. & exports)	475.2	502.5	488.1

*Compiled from forecast of Appalachian Coals, Inc.

Bituminous Highlights

The Markets in '57 and '58 . . .

Problems and Progress

COMPETITION—Tough in '57 and will get tougher in 1958 as each fuel fights immediate business uncertainties. Percentage-wise in '57, oil and gas gained faster than coal in electric utility sales. But coal's long-range position is sound and new markets, notably in Florida, are opening up. Losses in retail, industrial and railroad markets totaled 25.7 million tons—in part due to conversions. Competition in steel and export was not significant. Coal's legislative battle with natural gas is largely stalemated and mandatory controls on residual oil imports are not yet in the picture. Competitive nuclear power? Still remote.

ELECTRIC UTILITIES—Total shipments of 162 million tons (including 3.5 million tons of anthracite) are up 4 million but lower than expected. In prospect for '58: an 11.5 million-ton jump for bituminous. Utilities launch long-range expansion push in '58 and continue drive for operating economies.

STEEL AND CHEMICALS—Last year, the third best in history, meant 111 million tons of coal. Limited use of direct iron-ore reduction methods in coming years requires close watching. Chemical companies still take all the by-products coke ovens can supply. Note, however, continued progress in new techniques for producing coal chemicals.

INDUSTRIAL AND CEMENT—Shipments dropped 9% to 96 million tons but hopes are undimmed for expanding the market. Cement mills, on strike in '57, should increase orders. Bituminous Coal Institute reports 4 million tons of new or retained tonnage in first year of operation. Conversions to coal most significant in Eastern Seaboard States and Middle West.

RETAIL—A mild winter and conversions to competitive fuels took tonnage down 10 million tons to 36 million. Deliveries may move up to 40 million tons in '58. Aids to the cause: BCI promotion; improved design, efficiency and availability of automatic heating equipment.

RAILROADS—Usage fell from 12.3 to 8.6 million tons. Continued declines expected. The coal-fired gas-turbine locomotive—nearing commercial application—is still the white hope of recovery.

EXPORTS—A record 78 million tons (including Canada) were shipped—due entirely to an added 10 million tons overseas. This year should be at least as good with overseas deliveries possibly up from 58 to 60 million tons. Widespread depression in ocean freight costs is a bulwark to the market but has cut sharply into expansion plans of American Coal Shipping. Note the trend to larger colliers.

MANAGEMENT—Planning shows more stress on long-range needs, such as, personnel, property modernization and expansion, merchandising and research. Many executives see the fulfillment of these needs as the best eventual solutions to the profits squeeze, stiffer competition and other recurring, immediate problems.

TRANSPORT—In spite of another hike in freight costs due Feb. 1 of this year, efforts of a few railroads to cut coal-hauling rates in '57 suggest possibility of some general easing in pressure for higher fees. Hopper deliveries increased considerably last year giving firm prospect for improved car supply. Pitt-Consol's 108-mi pipeline from Georgetown to Eastlake, Ohio, went into regular operation late in '57.

LABOR—At least until production picks up substantially, most observers doubt any campaign for another wage hike. Upheld was the authority of Secretary of Labor Mitchell to set minimum wage rates for nonunion mines supplying coal to Federal agencies.

LEGISLATION—The current session of Congress will take on numerous matters of business left unfinished last year, including the transportation tax, percentage depletion and others affecting coal's competitive position with oil, gas and atomic energy. Not much prospect of final action.

Anthracite Score

OUTLOOK FOR '58: At Least as Good as '57

Anthracite fared worse in 1957 than in 1956. No further worsening is expected in 1958 and the prospects of a rebound are better-than-fair if a cold heating season is encountered.

In spite of continued strength in overseas and industrial markets, commercial hard-coal output (excluding colliery fuel) fell 11.5% from 28,100,000 tons in 1956 to an estimated 25,200,000 tons last year. Major cause of the drop: a mild winter which cut heavily into U. S. and Canadian demand for anthracite as a space-heating fuel.

Sharply-increased purchases by France, Belgium and Italy more than offset reduced buying by the Netherlands. Total shipments to Europe, however, fell from 2,723,000 tons in 1956 to about 2,565,000 tons in 1957. Meanwhile, sales to Canada, declining some 525,000 tons, took the total export tally down from 5,244,000 to about 4,550,000 tons.

Industrial markets showed strength across-the-board, according to a report of the Anthracite Institute. During the 12-mo period ending Sept. 30, 1957, shipments to electric utilities, coke manufacturers and Great Lakes ports rose to 4,363,000 tons—about 9% higher than the previous 12-mo period.

Common to retail, industrial and export markets was increased use of small sizes. In fact, preliminary data indicates that anthracite markets—for the first time in history—are now based on steam sizes. Industry analysts estimate that rice, buckwheat and smaller sizes accounted for about 52% of total sales in 1957.

Producers left no stones unturned to fill the strong demand for small sizes. But, with production still based on large sizes, some companies found it necessary to break these down for sales at unprofitable prices.

Notable on the retail scene was the continued upward trend in sales of automatic heating equipment, primarily to schools, apartments, hospitals, government buildings and other large space-heating establishments. Sales of automatic units have risen for 39 consecutive months.

A *Coal Age* feature (April, 1957) pointed to the prospects for growth in anthracite use by large space-heating outlets as the "touchstone for preventing erosion of the space-heat-

ing market. An all-out industry-wide push could (1) compensate for possible losses in the home-heating market, or (2) boost total space-heating sales by 2 to 3 million tons if home-fired tonnage remains about the same."

The school market is due for special emphasis in 1958. The Anthracite Information Bureau, for example, plans to step its direct-mail, equipment-display and workshop programs aimed at acquainting officials of new and remodelled public and parochial schools with the advantages of modern anthracite. Electric Furnace-Man, Inc.—a leader in the equipment manufacture field—is gearing up to expand its equipment displays at school-board meetings.

How will the total anthracite market pan out in 1958? Retail deliveries, already pitched to a mild-winter level, are not likely to get worse. Thus, if overseas and industrial sales maintain their present momentum, chances are total sales will hold at least to the 25- to 26-million ton annual rate. A more severe winter could take tonnage back up to the 1956 level of 28 million tons.

Bituminous Markets

COMPETITION: Getting Tougher

While there are a few exceptions regionally or market-wise, any notion that oil and gas gave ground generally to coal is completely unfounded in the facts of 1957. During 1958, furthermore, tough competition will get tougher as each fuel fights to minimize losses likely to accrue from uncertainties of the immediate business future.

Although utility coal burn in 1957 was 4,000,000 tons higher than in 1956, both oil and gas gained faster than coal on a percentage basis. In the year ending Sept. 30, 1957, FPC reports show that electric power plants consumed 161,701,444 tons of coal; 81,027,065 bbl of oil; and 1,327,082,419 MCF of gas. This fuel burn, compared to the previous 12-mo period, represented increases of 3.1% for coal, 11.3% for oil and 9.8% for gas.

Note also that competitive fuel gains were recorded in coal-competitive territory. Oil, for example, as brought out elsewhere in this report, showed a higher percentage gain in the Middle Atlantic Region and gas in the West North Central Region.

In industrial, retail and railroad markets, no one could say how much of coal's losses were due to the general slowdown in business activity during the last half of 1957 and how much to inroads by competitive fuels. Losses in these three markets totaled 25.7 million tons. Without much doubt, however, it seems reasonable to assume each suffered sizable cuts because of conversion to other fuels.

Competition was not significant in either export or steel markets. Export had its best year in history; coal tonnage for steel use was the third highest. Of more significance in steel was possible increased use of direct iron-ore reduction methods. In export, the widespread depression in shipping rates cut sharply into expansion plans of American Coal Shipping, Inc.

Important to all markets, USBM geared up to launch its new program of distribution statistics, effective Jan. 1, 1958. Data gathered from producing companies will make it possible to compare coal sales with those of competitive fuels in coal-marketing states. First reports will provide distribution data for the calendar year 1957. For 1958 and years following, reports will be issued quarterly.

The competitive picture, of course, is never black or white. And coal's long-range position remains generally sound. Both oil and gas claim strong future positions in spite of talk of dwindling reserves and price rises. But coal's great potential for increasing labor productivity should widen its price advantages over competing fuels during the next 5 to 10 yr.

There is also the prospect of opening new markets previously not considered competitive. Last year, for example, coal producers, railroads and other allied interests organized to develop a potential 12-million-ton utility market in Florida, now based primarily on oil (*Coal Age*, August, 1957, p 118).

In the continuing battle against natural gas, coal won two at least temporary victories:

1. Last October, Canada's Prime Minister Deifenbaker refused to approve exports of Canadian gas pending further study of its possible effects on the Canadian economy.

2. The U. S. Court of Appeals for the District of Columbia ruled Dec. 21 that the FPC cannot approve gas rate increases without prior customer approval. The "Memphis ruling," if upheld by the Supreme Court, might cut gas industry expansion funds.

On the other hand, efforts to reach a compromise on the Harris-O'Hara natural-gas bill ended in a stalemate with the gas industry refusing to give up dump sales to utilities in exchange for coal-industry support of the bill.

Residual oil imports remained at levels higher than acceptable to coal and, at year-end 1957, the immediate outlook for voluntary reductions by importing companies was not encouraging.

By and large, competition from nuclear power is no closer than reported in *Coal Age*, January, 1956, p 54. But some speed-up in the federal atomic power program is possible this year as a result of industry's retrenchment from high development costs and the remoteness of profit return.

ELECTRIC UTILITY: '58 Growth to Pace Future

Accelerated utility expansion in 1958 should kick off coal's long-range growth in electric power although there was some letdown in market expectations in 1957.

Last year the utility coal burn reached an estimated 162 million tons, about 3.7 million above 1956. The 1957 jump was somewhat disappointing in terms of early-in-the-year forecasts, which projected increases up to 8 million. Part of the disappointment was due to gains made by oil and gas in coal-competitive territory. Part was due to underestimating inventory coal carried over by utilities from 1956.

Whatever "disappointment" occurred in 1957 should be more than offset in 1958 which should see utilities boost their coal burn 11.7 million tons to 173.7 million. Continued growth also is anticipated to 183.1 million tons in 1959, 196.1 million in 1960 and 205.9 million in 1961. These projections are based on tonnage-use estimates reported late in 1957 to *Keystone Coal Buyers Manual*, a *Coal Age* affiliate. The reporting utilities accounted for about 55% of utility coal burn in 1957.

Firming up accelerated growth in coal's biggest market is this central fact: electric utilities start their long-range expansion push in 1958. Scheduled new capacity jumps to a record

16.4 million kw—nearly double last year's. About 80% of new capacity additions in 1958, or 13.7 million kw, will be based on fossil fuels, with coal leading by a wide margin.

Utilities continue their drive to effect operating economies through building larger, higher-pressure plants primarily based on coal.

Last December, AGE announced it had put the first of a series of eight 225,000-kw units into operation, namely: Unit 3 of Ohio Power Co.'s Muskingum River plant between Zanesville and Marietta, Ohio. At the same time, AGE stated it had units under construction in four states which would raise the system's capacity from 4,585,000 kw to 6,365,000 kw by 1960. This capacity increase includes two 450,000-kw units (the largest ever built) and the seven other 225,000-kw plants which are due on the line in 1958.

Also announced in 1957:

1. The Southern Electric Generating Co. (jointly owned by Alabama Power and Georgia Power) said plans were underway to build a 1,000,000-kw generating station on the Coosa River, Alabama. The station, composed of four 225,000-kw units, would burn from 2 to 3 million tons of coal a year (*Coal Age*, June, p 142).

2. Public Service Electric & Gas (N. J.) stated that its huge Bergen generating station, now under construction, would put two 290,000-kw units on the line, one late in 1958, the other early in 1959. Needed for the station's combined 580,000-kw of capacity: 1 million tons annually (*Coal Age*, November, p 144).

3. The Public Service Co. of Indiana said it would add two 150,000-kw units to its 300,000-kw station being built at New Albany, Ind. (*Coal Age*, July, p 144). Ultimate capacity will total 600,000 kw.

A full review of the utility market starts on p 78 of this issue.

STEEL AND CHEMICALS: '57 Third Best Year

In spite of reduced operating capacity during the last quarter, steel output in 1957 reached about 113 million tons—the third best year in history, exceeded only by the 115 million tons of 1956 and the 117 million tons of 1955. To make 113 million tons of steel in 1957 and to supply coke-oven by-product needs of the chemical and gas industries, steel companies used an estimated 111 million tons of coal.

The low level of steel users' inventories at year-end 1957 set the stage for a possible pick-up in steel buying during the first quarter of 1958, according to steel-industry spokesmen. If this prediction bears out and the last half of 1958 brings expected improvement in general business conditions, the dip in 1958 steel output might be held to 2 million tons. In turn, coal use would amount to 109 million tons.

Changing technology in the steel industry bears close watching by coal. Last year two methods for direct reduction of iron ore were reported nearing commercial phases (*Coal Age*, September, 1957, p 133).

Limited use of direct-reduction methods is in the cards during coming years. There is, however, no indication yet that the steel industry plans to give up its heavy investment in blast-furnace and open-hearth production (*Coal Age*, May, 1956, p 56). Worth noting, too: direct-reduction processes still require a reducing agent and coal is the logical source.

No letdown in demand for coke-oven chemicals occurred in 1957 or is anticipated in 1958. But prospects for expanding the market for coal chemicals through new production techniques are advancing notably. Discussing these prospects as they apply to Pitt-Consol's carbonization plant at Cresap, W. Va., Joseph Pursglove Jr., vice president, research and development, said (*Coal Age*, January, 1957, p 73):

"We believe that once the burning of char efficiently has been demonstrated, and that once the high-capacity fluidized-solid low-temperature process has also been demonstrated on a full commercial scale, one can begin to plan on other manufacturing complexes consisting of coal-to-char-to-electricity, to chemicals, to pipeline gas, to gasoline, to synthetic rubber, and so on."

INDUSTRIAL: Down 9% But Future Promising

Sales to "other industrials" and cement mills dropped 9% from 105 million tons in 1956 to about 96 million tons last year. The drop was attributed primarily to a general decline in business activity during the last half of 1957. At least part might have been offset by gains in cement mill use that were expected to accompany sustained high-level construction activity. But a long summer strike kept cement consumption down to 9 million tons, some 200,000 tons less than in 1956.

In spite of the 1957 record, hopes continue undimmed for expanding the industrial market in 1958 and later years. Bituminous Coal Institute, formed in October, 1956, to promote the industrial market (*Coal Age* January, 1957, p 54), commented on its first anniversary:

"The immediate results in the first year were more than 4,000,000 tons of new or retained tonnage. The long-term effect of telling coal's story to many thousands of people who influence plant design is hard to calculate, but will result in greater tonnage in the future."

Worth noting also, BCI states that "a trend is developing throughout the country among both large and small commercial and industrial users to convert oil and gas heating units to coal.

"Conversions to coal began early last year as oil and gas prices rose, and the most significant number of changeovers from other fuels occurred in the eastern and southeastern states and in the Middle West. The industrial movement to coal as a fuel was headed by metalworking industries in the North, and by textile, chemical, aluminum and paper manufacturers in the South. Big gains were registered in the laundry and dairy industries, as well as in commercial establishments, such as, shopping centers, apartments, hotels and motels, universities and hospitals. Coal made a come-back in the Nation's school buildings and in other state and local government building projects, such as, county courthouses and housing projects."

RETAIL: Nose Dive in '57; '58 Prospects Better

Against an expected drop of 2 million tons in retail use, tonnage in 1957 took its sharpest dive in recent years from 49 million tons in 1956 to 36 million tons. A mild winter and more conversions to competitive fuels were held largely responsible.

In spite of the drop, much industry sentiment looks for retail to level off, under normal winter conditions, to be-

tween 40 and 45 million tons. Some increase in retail deliveries in 1958, perhaps to 40 million tons, might thus be anticipated.

One boon to the retail cause will be felt in increasing support from Bituminous Coal Institute, now fully staffed on a nationwide basis to render engineering aid and to provide competitive fuel-cost data. BCI will offer its main support in the promotion of sales to large space-heating establishments, such as, schools, hospitals, greenhouses, apartments and government buildings—most of which come within the merchandising sphere of retail coal yards.

Another boon to the retail cause will be constant improvement in the design, efficiency and supply of automatic heating equipment. Bituminous Coal Research, for example, reported successful field testing of 32 improved Coal-O-Matic residential heating units (Fall 1957 bulletin). As a result, 300 more improved units will be manufactured by Dallas Engineers for the 1957-58 heating season.

The same bulletin also announced the first installations of the Coal-Pak Automatic, developed by BCR and manufactured by the International Boiler Works Co. This unit is designed for use in commercial, small industrial and institutional plants. It features continuous ash removal and automatic furnace operation through a wide load range.

Typical of those companies with strong faith in future retail tonnage is the Princess Coal Sales Co., Huntington, W. Va., which serves some 2,000 retailers in the U. S. and Canada. A *Coal Age* feature article (January, 1958, p 70) on this company's solid retail position included this comment by J. E. Cooke, manager of sales:

"Princess Coal Sales expects to continue its [16 consecutive years of] growth in the retail market. There is no reason why we cannot continue this growth if we hold to the policies of concentrated coverage and service to our customers. We are looking forward to many future years of service to the retail coal merchant and to the domestic consumer."

RAILROAD: Extinction or Recovery in 5 Yr?

Locomotive use of coal in 1957 hit about 8.6 million tons—less than half of the 17.4 million tons recorded in 1954. During each of the 3 yr, 1955 to 1957, tonnage dropped in successively greater quantities—1.9, 3.2 and 3.7 million tons—leaving this question still unanswered: Will there be extinction or recovery in this market during the next 5 yr?

Based on present usage, most observers see no signs of arresting continued declines in this market. Conceivably, however, a ceiling might occur at 2 to 3 million tons during the next 3 to 5 yr.

The one white hope of recovery in railroad tonnage is still pinned on success of BCR's coal-fired gas turbine locomotive which moved nearer to commercial application in 1957. Before the year was out, the Locomotive Development Committee indicated that the laboratory phase of its program should be concluded. Meanwhile LDC also announced that agreement had been reached between Alco Products and Union Pacific on the building of the first commercial coal-fired gas-turbine locomotive.

At BCR's annual meeting, April, 1957, John W. Igoe, now director of administration, pointed to an important by-product likely to come out of the locomotive development program. Studies are underway to determine the potentials of using coal-fired gas turbines in nonutility power-generating plants. Steam plants in this group burn 110 million tons of coal-equivalent annually. Although many of these are already coal-based, many more could probably be brought into the coal fold with a more efficient small-scale stationary plant.

EXPORTS: Record 78 Million Tons

Total exports of bituminous (including Canada) soared to a record 78 million tons in 1957, exceeding the previous all-time high of 68.6 million tons set in 1947.

Record total exports were due entirely to overseas shipments which reached an estimated 58 million tons—a new overseas peak surpassing the 1956 mark by 21%, or 10 million tons. About two-thirds of the increase resulted from heavier purchases by western European countries, especially West Germany. Exports to Canada in 1957, about 20 million tons, were slightly below but close to the previous year's tonnage.

The new overseas peak came despite the concern of some mid-year forecasters who predicted that a mild winter and high inventories of American coal overseas would keep shipments down to 53 million tons. Such market strength where weakness was expected is just cause for optimism about the future. Overseas tonnage in 1958, therefore, should at least hold to last year's 58 million tons. And an upward movement to 60 million tons is a real prospect.

Low ocean freight costs should continue as another bulwark to high-level U. S. coal exports. The basic rate (Norfolk to Rotterdam) fell to $3.50 to $4 in 1957. Year-end reports from shipping circles indicated there was little prospect for upward movement in this rate during the immediate future.

Although low shipping rates were favorable to U. S. coal exports, they brought more tough sledding for American Coal Shipping, Inc. The coal shipping agency expected to put 81 vessels in service last year (*Coal Age*, April, 1957, p 132). But the dip in shipping rates to below-profit levels and continued labor troubles cut sharply into its program. Result: ACS had only seven ships by the end of November, 1957. Of these, one was carrying coal, one was hauling grain and five were idle.

Also notable in 1957 was the trend towards greater use or planned use of larger colliers. The 16,000-ton M/S Acciaiere—the first of a fleet of six Italian coal-carrying ships—made its first trip from Norfolk in August (*Coal Age*, September, 1957, p 126). Meanwhile, the Pocahontas Steamship Co. announced plans to build a 24,000-ton coal vessel—the first of three self-discharging "super colliers." Delivery of the ship was scheduled for October, 1958 (*Coal Age*, October, 1957, p 126).

Across-the-Board

MANAGEMENT: More Stress on the Future

Management last year had to cope with the immediate problem of a profits squeeze occasioned by higher costs for labor and supplies. Also, there was the spectre of stiffening competition from oil and gas (see "Competition"). As vital as these problems were—and continue to be—their importance was

How the Top 15 Coal-Producing Groups Ranked in 1957

Compiled by KEYSTONE COAL BUYERS MANUAL, A Coal Age Affiliate

Group or Company	1957 Tonnage	% Change, 1956 to 1957	1956 Tonnage	% Change, 1955 to 1956	Standing 1957	1956	1955	1954
Pittsburgh Consolidation Group	34,939,943	+ 4.2	33,510,228 (1)	+13.3	1	1	1	1
Peabody Group	23,172,296 (6)	+ 6.8	21,698,493 (3)	+59.9	2	3	3	8
U. S. Steel (c)	23,067,215	+ .7	22,889,712	− 9.0	3	2	2	2
Island Creek	13,852,711	− 6.3	14,782,405	+44.9	4	4	4	5
Bethlehem Steel (c)	13,275,976	+11.5	11,900,339 (2)	− 3.9	5	7	5	6
Pittston Group	12,654,000	+21.8	10,391,461	+28.9	6	6	7	9
Eastern Gas & Fuel	11,922,466	+ 7.5	11,087,088 (4)	+12.5	7	5	6	4
Truax-Traer	7,906,828	− 1.7	8,045,155	+ 5.0	8	9	8	7
Freeman	6,905,475	+ .1	6,877,267	+ 5.0	9	11	10	23
West Kentucky Group	6,521,540	−15.4	7,714,649	+88.4	10	10	19	29
North American Group	6,140,710	− .5	6,174,746 (5)	+14.0	11	12	13	14
Ayrshire	5,778,909	+ 3.4	5,587,387 (3)	+14.7	12	13	16	16
Republic Steel (c)	5,253,225	− 1.7	5,347,506	− 8.3	13	14	11	17
Rochester & Pittsburgh	4,829,612	− 5.1	5,087,416	+10.5	14	16	17	15
Old Ben	4,769,113	− .7	4,803,000	+13.3	15	17	18	18
Totals	180,993,019	+ 2.8	175,896,852					

(c) Captive

1. Includes Pocahontas Fuel Co. Excludes Consolidation Coal Co., Kentucky Div.; also excludes Harmar Coal Co. and Mathies Coal Co.
2. Includes Consolidation Coal Co. Kentucky Div.
3. Includes 50% of Gibraltar Coal Co.
4. Includes Ebensburg Coal Co.
5. Includes Seward No. 5 Mine, Pennsylvania Electric Co.
6. Includes Terteling Bros. Coal Co. Production, acquired 5/11/57

The industry's top 15 producing organizations mined 180,993,019 tons in 1957, 36.8% of the total bituminous and lignite production in the U.S.A. Eight of these producers showed gains over 1956. These top 15 increased production by 2.8%, as against the industry's loss of 2%.

In contrast to 1956's record when seven of the top 15 companies acquired other mines, only one such instance occurred in 1957.

Output of the 15 top ranking groups in 1956 was 175,374,616 tons, or 35% of the total. Ten years ago, in 1947, the top 15 produced 156,285,786 tons or 24.9% of the total.

overshadowed by increasing awareness of the need to solve long-range problems, such as, personnel training and recruitment, property modernization and expansion, more effective merchandising and expanded research. In fulfilling these needs, many executives see the best eventual solutions to recurring immediate problems.

In the last 14 mo, various issues of *Coal Age*, including the *Mining Guidebook* (Mid-July, 1957), have spelled out the many efforts companies are making or might be making to develop more effective personnel forces. Especially notable were:

1. Maintenance training programs at Duquesne Light Co.'s Warwick Mine, Greensboro, Pa. (April, p 76), and at Stonega Coke & Coal, Big Stone Gap, Va. (January, 1958, p 110).

2. A foreman-training program at the West Virginia Div., Truax-Traer Coal Co., Kayford, W. Va. (June, p 68).

3. A personnel-testing program developed by Hanna Coal Co., Cadiz, Ohio, and West Virginia University (September, p 70).

4. A youth-training program sponsored by the Pocahontas Industry Education Council, Bluefield, W. Va. (November, p 54).

More effective merchandising will get one of its biggest boosts from Bituminous Coal Institute, now fully organized, on a nationwide basis, to provide engineering aid and comparative fuel-cost data (see "Industrial;" "Retail").

Largely because of the dip in production, the problem of money to finance coal's long-range expansion needs did not make headlines in 1957. But the problem is still there. And, to remind the industry of this fact, NCA put an investment consultant on its annual convention program last June. John W. Spurdle, Dominick & Dominick, told the convention in part (*Coal Age*, July, 1957, p 53) that:

"The growing need of the bituminous coal industry for additional funds to expand production and improve the efficiency and economy of its operations to reduce costs is all too apparent. Our staff figures that the industry should spend between $1.5 and $2 billion over the next 5 yr for these purposes, and that a great deal of this will represent new, outside money . . . The industry is in a new phase of growth and forward-thinking companies which seek to take advantage of their opportunities will do well to explore the possibilities of arranging outside financing . . ."

Two particular developments indicated increasing response to a much-needed expansion in coal's research efforts. In one instance, Congress prepared bills to implement a Federal coal-research program (see "Legislation"). The program includes recommendations calling for the establishment of a three-member Research and Development Commission and an initial appropriation of $2 million.

In another instance, BCR announced agreement last December between producing companies and allied interests on the building of a major research center for bituminous in Pittsburgh. The new center—scheduled for completion in 1959—will consolidate all present laboratories and offices of BCR.

TRANSPORT: A Note of Optimism

Shippers started off the new year facing another hike in rail freight rates. With few exceptions, this meant 10c more per ton, effective Feb. 1.

While the trend is far from widespread, however, efforts of a few railroads to cut coal-hauling rates in 1957 suggest the possibility of some general easing in pressure for higher fees during the coming year. In one case, the Illinois Commerce Commission approved rate cuts requested by the Illinois Central, the C. B. & Q. and Mo-Pac (*Coal Age*, November, 1957, p 138). In another case, the Louisville & Nashville proposed reduced rates on fine coal shipments to Florida (*Coal Age*, October, 1957, p 162).

Also in the 1957 rail freight picture, NCA's Coal Car Supply Committee voiced optimism on hopper deliveries. Joseph T. Berta, committee chairman, said that a solid and firm foundation had been laid toward the elimination of crippling car shortages which faced the industry in 1955-56 (*Coal Age*, July, 1957, p 86). During the 5-mo period ending May 1, 1957, deliveries were averaging 2,625 cars per mo, considerably above the minimum original goal of 2,000 per mo. In spite of this improvement, however, railroads sought and obtained increases in demurrage charges which were attributed partially by the ICC to the continued car shortage (*Coal Age*, July, 1957, p 142).

Other transport developments in 1957 included regular operation of: Pitt-Consol's 108-mi pipeline from Georgetown to Eastlake, Ohio; the widespread depression in ocean freight rates (see "Export"), and greater use of river barges for coal traffic.

LABOR: Cautious Optimism in '58

Continued peace characterized the labor front generally in 1957. At least until production picks up substantially —and this is not likely to occur, if it does, until the second half of 1958— most observers doubt that UMWA will undertake any campaign for another wage hike. Cautious optimism prevails and this is based primarily on the better understanding of mutual industry interests achieved between management and labor during recent years.

Highlighting the labor year, the U. S. Court of Appeals for the District of Columbia, on Sept. 19, upheld the authority of the Secretary of Labor to establish minimum wage rates of producing companies supplying coal to the Federal Government on contracts over $10,000. Action in the case was brought by Ruth Elkhorn Coals, Inc. and other nonunion bituminous operators in Virginia.

Under terms of the Walsh-Healey Government Contracts Act, Secretary Mitchell had set an hourly wage rate of $2.245 for non-union mines in Pennsylvania, Michigan, Ohio, Maryland, West Virginia, Illinois and parts of Tennessee and Kentucky. Mr. Mitchell scheduled a public hearing Feb. 3, 1958, to determine if this rate —pegged to that prevailing under UMWA contracts in the same areas on Nov. 25, 1955—should be revised upward to allow for 1956 wage increases.

LEGISLATION: Most Action Deferred

The first session of the 85th Congress adjourned Aug. 30 with most of its business unfinished. Enacted measures of interest to coal, and those carried over to the current session, include the following:

Taxation – The first session extended the 52% corporate income tax to June 30, 1958, and set extremely strict limitations on rapid tax writeoffs of defense facilities. Up for consideration in the current session: major tax policy revisions, including rate structure, percentage depletion rates, tax aid to small business and the transportation tax.

Natural Gas—Speaker Rayburn deferred vote on the Harris Bill to the current session. Deferment was attributed to the failure of a compromise by which the natural gas industry would agree to give up dump-gas sales in exchange for coal-industry support of the bill.

Oil—No action was taken to impose mandatory controls on residual oil imports, still considerably above levels acceptable to coal. In its Aug. 16, 1957, report, the Special Senate Subcommittee on Antitrust and Monopoly (1) criticized the administration for not diverting Venezuelan residual oil to Europe during the Suez crisis, and (2) suggested that the Department of Justice study the possibility that residual oil importers "pursued a deliberate pricing policy designed to harm the coal industry."

Atomic Energy—The Atomic Authorization Bill, providing for the construction of five atomic reactors and the study of two others, was passed despite opposition to its public-power provisions by coal and utility interests. Other bills provided federal insurance for privately-owned plants and authorized U. S. participation in the International Atomic Energy Agency.

Public Power—H. R. 8643 authorized construction of a new hydroelectric plant on the Niagara River, with the proviso that 50% of sales be made to public bodies and nonprofit cooperatives in N. Y. and neighboring states.

Consideration of Senate-approved legislation on Federal construction of Hell's Canyon Dam is due for House discussion in the current session.

The Senate passed S. 1869 permitting TVA to finance its power expansion program through revenue bonds. The amended version, imposing area limits on sales of power produced, comes up for House consideration in the current session.

Transportation—Congress passed P. L. 85-246 requiring carriers to file rates with the ICC on all government shipments except those involving national security. Deferred to the current session:

1. A proposal creating a Federal agency for buying railroad equipment and then leasing it to individual railroads.
2. Bills providing penalty per diem charges.
3. Three "shall not" measures prohibiting ICC from considering how proposed rates by one type of carrier may affect other types.
4. Omnibus bills specifying that ICC should only prescribe maximum or minimum reasonable rates.

Coal Research—House and Senate members introduced numerous bills designed to implement the Federal coal-research program recommended in a special House subcommittee report. All measures were referred to committees, pending possible action in the current session.

Also pending in the current session are bills dealing with pre-merger notification to Federal agencies, an amendment doubling the amount of acreage leasable under the Mineral Leasing Act, and extension of Securities and Exchange Commission authority to cover all corporations with more than 1,000 stockholders and with assets exceeding $10 million.

McGraw-Hill Economists See . . .

Rugged First Half . . . But Still a Satisfactory Year

Department of Economics, McGraw-Hill Publishing Co., Inc.

The boom is over and business is now battling a downturn. But the business outlook for 1958 gives no cause for grimness. The first half of the year will be rugged. But a gradual pickup is in the cards for the last half. Over all, gross national product this year should total $441 billion, about 1½% increase over 1957. (Gross national product is the total value of all the goods and services the economy produces annually.)

This is a smaller rate of growth than the country has been accustomed to in recent years. **But a larger share of next year's growth should be in real terms than was the case in 1956 and 1957. In the last two years, increases in GNP reflected in large part inflationary price rises. This year, with prices levelling off, inflation will not be a major problem.**

Two key factors underlie the tough sledding business faces over the next few months:

1. The temporary slowdown in national security expenditures. Such outlays are now running at an annual rate about $1 billion less than they were during mid-'57.

2. The cutback in capital spending this year. According to McGraw-Hill's fall survey, outlays on plant and equipment this year will total $36.1 billion, a drop of 7% from last year's record of $38.6 billion for plant and equipment.

These two cutbacks have slowed down manufacturers' sales and new orders since last summer. So production and employment are trending off, as manufacturers run down inventories accumulated in the boom period. **Before the skid is over, the Federal Reserve Board's industrial production index may sink as low as 135. A year ago the industrial production index stood at 146.**

But—barring a prolonged auto strike this spring—the index should start climbing in the latter part of the year. The prime reason: an upswing in defense spending. By the second half, the government plans to step up military spending, increasing the annual rate of such expenditures by $2 or $3 billion. Defense dollars are leverage dollars. That is, defense orders quickly create more jobs and more business for other manufacturers, rapidly generating additional income.

But the economy is not relying solely on an expanded military program to keep out of a serious slump this year. Other factors which should give the economy a boost this year include:

An increase in housing starts. Easier credit this year should stimulate home building. New housing starts (public and private) should total almost 1.1 million this year, 50,000 more than last year. More houses, furthermore, should pep up appliance sales, which lagged in 1956 and 1957.

More state and local spending. Thanks mainly to stepped-up activity on the highway program, state and local spending should jump from $36 billion in 1957 to $38 billion in 1958.

A continuing high level of personal consumption expenditures. Consumer spending this year should top last year's total of $281 billion by $6 or $7 billion. Americans will go on buying at an impressive rate, despite a temporary spell of rising unemployment, because total disposable income (income after taxes) should more than hold its own. Tax-free unemployment compensation benefits, liberalized in recent years, should cushion the effects of income losses due to joblessness. Furthermore, union labor will probably gain some wage increases as many important contracts come up for negotiation this year.

Wage hikes will mean a tighter squeeze on profits. But, at the same time, higher pay will help prevent goods from piling up, unbought, on store shelves. **All told, consumer income should register a 2 or 3% increase over last year's figure of $300 billion, and this will support a late '58 rise in retail sales and industrial production.**

To sum up: Business enters 1958 with excess capacity on its hands and temporarily sluggish demand for its goods. But if consumers keep spending and our missiles program gets moving as anticipated, 1958 may end up as a satisfactory business year for the U.S. economy.

Electric utilities start their long-range push in capacity expansion in 1958 . . . Will coal be ready to take full advantage of its opportunities in this market?

HUGE BERGEN generating station being built by Public Service Electric & Gas will put two units on the line. One is due late in '58; the other, early in '59 . . .

Coal for Electric Power: 1958-75

- Forecast on minimum tonnages.
- Possibilities on above-minimum tonnages.
- Where competitive power sources stand.
- How to solidify the market.

By W. A. Raleigh Jr., Assistant Editor, *Coal Age*

HOW MUCH COAL will be needed to supply tomorrow's electric power market? A *Coal Age* blend of facts, trends and opinions—plus a dash of crystal-ball gazing—shows that utility coal burn should move up from 162 million tons in 1957 to the following minimum tonnages:

1960	191,000,000
1965	292,000,000
1970	390,000,000
1975	467,000,000

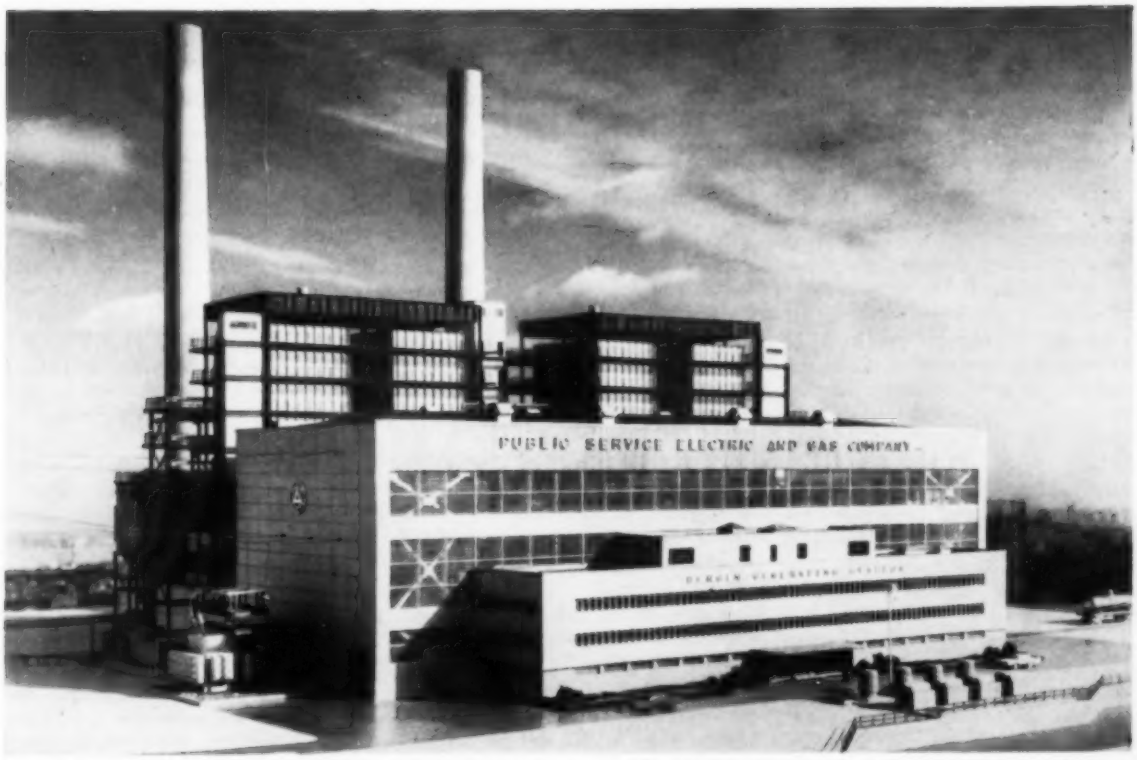
These projected tonnages are recorded as minimums on the assumption that coal at the worst will hold its present 70% share of the total fossil-fuel power market. They are otherwise based on estimates of the Nation's electric energy output needs, and improvements in average coal-burning efficiency of generating plants.

The assumption that coal at the worst will maintain its present position takes into account current utility use of oil and gas, trends in their competitive structure and estimates of future use. The conclusion is that oil and gas together cannot exceed their present percentage of the total fossil-fuel market, now about 30%. In fact, coal could gain at the expense of oil and gas—and probably will. What the 1965 and 1975 pictures would be with various levels of coal gain and oil and gas loss is shown in the following tabulation:

Percentage Supplied by:		Total Coal Tonnage, Millions	
Coal	Oil & Gas	1965	1975
70	30	292	467
77.5	22.5	323	517
85	15	355	567
100	0	417	667

Just what marks coal tonnages will hit in future years is a moot question. The answers—neither black nor white—are involved in a complex of the Nation's total energy growth, electric utility expansion plans and a constantly changing energy source picture.

In more detail, the following material documents salient characteristics of this complex. On p. 88, recommendations are made as to what coal can do to solidify its future competitive position.



WHEN COMPLETED, the $107 million Bergen generating station will add annual capacity of 580,000 kw to supply New Jersey's expanding residential, commercial and industrial markets. Needed to fire its boilers: 1,000,000 tons of coal per year.

Electric Energy: Due For Bigger Role

Long-range estimates show that the Nation's electric energy needs should double every 8 to 10 yr. Total energy needs are expected to double much more slowly, i.e.: every 25 to 35 yr.

The faster rate of electric energy growth serves to underscore this fact. Electric power systems—as massive as they seem today—are slated for a still bigger role. In other words, these systems now produce about 15% of the total energy consumed. Future decades, however, will see them take on a considerably higher percentage of the Nation's energy load.

Thus, across-the-board energy use will rise with increases in population and the national product. But the influence of these factors on electric energy growth will be dwarfed in importance by higher per capita use of electricity and by the accelerated trend toward automatic, electric-powered systems in industry and commerce.

Kilowatt Expansion: The Big Push Starts

Electric utilities will start their long-range expansion push in 1958. Scheduled new capacity jumps to a record 16.4 million kw—nearly double last year's. Kilowatt additions in 1959 and 1960 will dip slightly due to a drop in new hydro capacity, abnormally large in 1958.

Except for the hydro dip and barring major setbacks in the Nation's economy, new capacity will hold to the high 1958 level through 1960 and then move upward to 18.8 million kw in 1965 and to 26.8 million in 1970. Fossil-fuel steam plants, as shown in the accompanying table, are expected to account for the lion's share of capacity additions.

Electrical World, a McGraw-Hill publication, estimates that retirements of older generating units will scale upward from 400,000 kw in 1957 to about 2,000,000 kw annually by 1970. In spite of these retirements, the publication sees output and net generating capability climbing as follows:

	Output, Billion Kwhr	Load Factor %	Capability Million Kw
1955...	543	62.1	116
1957...	644	64.5	131
1960...	812	64.7	175
1965...	1,176	65.2	251
1970...	1,700	65.8	360

Based on this rate of growth, output and capability needs should reach about 2,225 billion kwhr and 468 million kw, respectively, in 1975.

Fossil Fuel Market: The Total Picture

Once total electric energy output needs are defined, figuring how much of this total will go to fossil fuels is primarily a question of judging first how much will be supplied by hydro and nuclear power.

Within the past 2 yr, the Nation has taken a bolder look at nuclear power development with these expected results. Industry may retrench from an expanded role because of staggering costs and the remoteness of profit return. Meanwhile, the Federal Government may take up much of the slack through expediting its

atomic power program (*Coal Age*, June, 1957, p 54).

The net effect, however, will probably be a drop in nuclear's share of 1975 commercial power, from a previous estimate of 10% (*Coal Age*, January, 1956, p 54) to about 7.5%.

Hydro power will grow in small, steady amounts but its share of the total electric power market will show a relatively sharp decline, from about 20% now to about 12.5% in 1975.

The above estimates indicate that hydro and nuclear power in 1975 will together supply as much of the total electric energy market as that now enjoyed by hydro alone. In other words, by 1975, hydro's present 20% share will probably be divided: 12.5% hydro and 7.5% nuclear.

Thus with a total projected electric energy output of 2,225 billion kwhr in 1975, fossil fuels would have to account for 80% or some 1,780 billion kwhr.

Between now and 1975, hydro's share of the total electric energy market will decline more rapidly than nuclear's share will increase. During the interim years, therefore, fossil fuels will probably take up the slack as follows:

	Percent of Total Electric Energy		
	Fossil Fuels	Hydro	Nuclear
1956	80	20	0.0
1960	82.5	17	0.5
1965	83.5	15	1.5
1970	82	14.5	3.5
1975	80	12.5	7.5

On this basis, fossil fuels must produce 670 billion kwhr in 1960, 982 billion kwhr in 1965 and 1,394 billion kwhr in 1970.

Fossil Fuel Market: Coal's Share

Perhaps more puzzling than the future size of the total fossil-fuel market is how much of it will go to coal.

Assuming that fossil fuels hold to about their 1956 share of the steam market (coal 70%, natural gas 22%, oil 8%), coal tonnage should hit around these marks:

	Coal Rate Lb per Kwhr	Coal Tonnage, Millions
1960	0.9	191
1965	0.85	292
1970	0.8	390
1975	0.75	467

Kilowatt Buildup, 1957-70: Thousands of New Kilowatts Capacity

	Fossil Fuels	Nuclear	Hydro	Total
1957	7,126	73	1,301	8,500
1958	13,666	0	2,746	16,412
1959	13,876	190	1,122	15,188
1960	13,529	635	1,100	15,264
1965	16,733	1,000	1,100	18,833
1970	23,308	2,400	1,100	26,808

Source: *Electrical World*.

Assumptions on how much each of the fossil fuels will share in tomorrow's electric utility market, however, are coming under closer scrutiny. Some observers are inclined to write off oil and gas participation in the long-range utility market. They argue that oil and gas reserves are dwindling and that both fuels will move toward premium markets as depleted supplies send prices up beyond competitive range.

Taking this stand, if oil and gas lost half of their present share of the electric utility market by 1975, coal tonnage would climb from the basic prediction of 467 million tons to 567 million tons. A 25% loss for competing fuels would send coal's market up to 517 million tons.

If oil and gas lost half of their present share of the power market by 1965, coal tonnage would jump from the basic prediction of 292 million tons to 355 million tons. A 25% loss for competitive fuels would mean coal's market would climb to 323 million tons.

On the other hand, current utility use of oil and gas, trends in their competitive structure and estimates of future use tend to discount either a major decline or increase in their combined share of the total fossil-fuel market. Rather, the indications are that there will be a modest increase for coal.

From Oil and Gas: Stiffer Competition

Looking at both the short- and long-range pictures, oil and gas give few grounds for claiming that they will lose more than a modest share of the electric power market to coal. Arguments supporting a strong position for competing fuels include the following:

On the legislative front (see Washington Report) . . .

1. No one really expects passage in 1958 of the Harris-O'Hara Natural Gas Bill which would save the gas industry from the more stringent features of utility-type regulation. In return for support needed to pass the bill, coal has sought a compromise amendment prohibiting dump sales direct to industrial consumers. Pipeline spokesmen, however, flatly state they must oppose the amendment as it would threaten their load factor and destroy a large part of their market.

2. Canada's Prime Minister Diefenbaker has temporarily kayoed Midwestern Transmission Co.'s plan to import daily 200 million cu ft of Canadian natural gas for U. S. markets. Militant public clamor over depleting Canada's fuel reserves through exports may halt the project permanently. Opposition, however, may eventually give way as the country desperately needs oil and gas exports to balance its foreign trade now adversely weighted with huge imports from the U. S.

3. Residual oil imports continue to arrive in amounts considerably above levels acceptable to the coal industry. There is, furthermore, little immediate prospect for mandatory Federal government restrictions.

Also in the oil picture is the possibility of "a renewed drive on home-heating and heavy fuel markets" (*Coal Age*, November, 1957, p 7). The stage has been set by a slowed-down rate of advance in 1957 gasoline use. In turn, this has brought "rising stocks of products in storage tanks, less-than-expected crude runs to refineries, and, in the United States, some cuts in prices paid to crude producers by refining companies."

Hitting more directly on target, Federal Power Commission reports show that oil and gas use for electric power are gaining faster than coal on a percentage basis. What's more, oil and gas are gaining more

Washington Report

Coal vs Oil and Gas

THE OIL AND GAS INDUSTRY will push hard for passage of the Harris-O'Hara Natural Gas Bill by Congress in 1958. But in private, most industry spokesmen have little hope for success.

The Eisenhower-backed bill — which would save gas producers from the more stringent features of utility-type regulation although leaving them under regulation of a sort—would have had a fair chance if it had passed the House last year. It cleared the House Commerce Committee and the House Rules Committee, but didn't come up on the floor before adjournment. That means it must pass both the House and the Senate in 1958, and hearings have not even been held in the latter body.

Rep. Oren Harris (D-Ark.), chairman, House Commerce Committee and co-author of the bill, is known to have strong doubts that the measure can now pass the House in 1958 if the coal industry continues to oppose it. This has inspired some efforts toward a compromise which would bring the coal industry behind the bill.

The National Coal Association has consistently held out for an amendment which would prohibit so-called below-cost or dump sales direct from the interstate pipelines to industrial consumers. Some producers might be willing to go for such an amendment in order to win coal support, but pipeline spokesmen have warned quietly but flatly that they would have to oppose any bill containing such an amendment because it would threaten their load factor and destroy a good portion of their market. In the face of this, the compromise move has about collapsed—and nobody really expects the gas bill to pass.

GAS IMPORTS—The coal industry has objected to the Federal Power Commission against the proposal by Midwestern Gas Transmission Co. to import up to 200 million cu ft of Canadian natural gas daily. The gas would be purchased at Emerson, Manitoba, from the Trans-Canada line now under construction. The gas would be sold in the upper U. S. midwest to customers including some big steel plants in the Chicago area.

MGT, a subsidiary of the Tennessee Gas Transmission Co., appeared to be in good shape on its application for FPC approval of the $100 million project until the political situation in Canada changed. The previous government had written a letter committing the Canadian government for eventual approval of the proposed export of gas by Trans-Canada to MGT. But in 1957 the conservative party came into power. Under this regime, consistently more critical of U. S. oil and gas operations in Canada, the Canadian Parliament created a royal commission on energy which is charged with studying oil and gas resources and making recommendations, among other things, on what Canada's policy should be on oil and gas exports.

Then last October, John Diefenbaker, the new Prime Minister, told Parliament that no new gas export licenses will be issued pending completion of the 1 to 2 yr study by the royal commission—and he wouldn't commit himself as to what the decision would be at that time. Meanwhile, a spokesman for White, Weld & Co.—underwriter for both the Trans-Canada and the MGT projects —told an FPC examiner that the MGT project cannot be financed until Diefenbaker either issues a "clear statement" affirming the previous export commitment, or the royal commission itself does. This appears unlikely.

Obviously MGT is left in a bad position. Not only is it unable to prove that the proposed Canadian gas supply is dependable, it is also unable to show financing. Meanwhile, other gas companies opposing the MGT proposal and seeking certification for the same service (but planning use of U. S. gas) are encouraged to believe the FPC may give them the nod.

All this adds up, of course, to a victory for the coal industry. There is, however, no room for long-term optimism on the part of coal. Canada is bothered by an imbalance of trade and desperately needs oil and gas exports to balance their huge imports. So, most gas industry experts expect the net result of the royal commission study will be a set procedure which will allow—perhaps even encourage—gas exports to the U. S. subject to certain restraint. This, of course, would not be good for coal.

RESIDUAL FUEL OIL IMPORTS—The U. S. Government has given no clear indication that it intends to do anything real to restrict residual oil imports. The voluntary crude imports restriction program, inaugurated last August, is working fairly well thus far. Defense Mobilizer Gordon Gray and his Cabinet Committee on Fuels Resources have reviewed the residual imports situation. They have sent out forms asking importing companies to begin reporting their residual fuel oil imports for the current month and projecting three months into the future. The first of these reports was due around Dec. 1.

Meanwhile, coal industry spokesmen say there has been no real upsurge of residual imports during recent months. They remain at about the same level. But this level is high enough for the National Coal Association to continue its drive for legislation imposing mandatory controls on residual imports.

The Eisenhower Administration is anxious to get the Reciprocal Trade Agreements Act extended by Congress next year without crippling amendments. Determination to make the voluntary program on crude work shows that administration officials are willing to go quite a ways to head off attempts to impose new import restrictions. It's doubtful anyway that they would be willing to go far enough in curbing residual fuel oil imports to satisfy the coal industry. Therefore, the government is not expected to bring residual imports under the voluntary restriction program unless a rather sharp increase is noted —*McGraw-Hill Washington Bureau.*

---

sharply in some territories where they compete with coal.

FPC reports show that utility fuel gains, on a nationwide basis, have dropped from 15.4% to 3.1% for coal, while moving up from 0.5% to 11.3% for oil and from 3.4% to 9.8% for gas. The reports are based on comparisons of 1957 with 1956 and 1956 with 1955 for years ending Aug. 31.

Particularly notable, the reports reveal an upturn in utility oil burn in the Middle Atlantic states. Here, where coal is supplying about 88% of electric energy needs, power plants consumed 5,944,415 bbl of oil from May to Sept. of last year—46% more than during the same 5 mo in 1956. Coal use rose only 2.7% from 13,559,901 tons to 13,930,957 tons.

In another example of stiffening competition, gas strengthened its position in the West North Central region where it already holds a slight edge over coal as an electric energy source. Here, utilities bought 86,944,446 mcf of gas from May to September of last year—6% more than during the corresponding 5 mo in 1956. Coal consumption, meanwhile,

fell 19% from 2,623,869 tons to 2,205,359 tons.

Are these gains temporary? The gas industry, for example, thinks not. The American Gas Association estimates that industrial sales, of which about one-third are to electric generating plants, will move up 45% from 43,410 million therms in 1957 to 63,010 million therms in 1964. The increase is equivalent to 80 million tons of coal.

On long-range supply and demand, AGA concludes:

1. Total available remaining supply of natural gas within the U. S. is at least 850 trillion cu ft.

2. The Nation's total annual demands will be 22½ trillion cu ft by 1975. (Net production in 1956 was about 11 trillion cu ft.)

3. The natural gas industry should easily be able to supply 1975 demand. Prices may be higher but competing fuels (and all other commodities) will also be more costly.

4. Substantial amounts of natural gas will still be available after 1975 to supply the Nation's needs for more than an additional decade.

5. In spite of adequate supply for the Nation as a whole, varying regional supply and cost problems warrant expanded research on substitute pipeline gases. Economical alternatives will help to control costs and extend the life of the natural product.

Coal's Position: Generally Sound

The answers to long-range fossil-fuel use are, of course, never black and white. Oil and gas are making impressive gains in the current utility market and claim strong future positions. There are grounds for believing that these gains are temporary, however, while coal's position remains generally sound and its record supports the conclusion that it can do better than merely holding the line—perhaps materially so.

Coal sales to electric power plants have increased every year since 1950. Tonnage rose an estimated 3.5 to 4 million tons last year. In the previous 7 yr, 1950-56, increases totaled 66.4 million tons. Note in particular: the 7-yr coal tonnage jump made up 78% of the utilities' total increase in fuel burn (85.9 million coal-equivalent tons) during the period.

In spite of inroads by oil and gas in 1957, coal is better than holding its own in most competitive areas on the long-range basis. In coal-competitive territory (excluding Florida, Mississippi, Arizona, West South Central and Pacific Regions), NCA reports that coal held 86% in 1956, 85% in 1955, 81% in 1954, 80% in 1953, 81% in 1952, 83% in 1951, and 80% in 1950.

Furthermore, real opportunities are opening up in areas not previously considered competitive by coal. Most notable is the state of Florida. Here utilities plan a shift from oil to coal which could bring a new 12-million ton market for bituminous (*Coal Age*, August, 1957, p 118).

Speaking on new markets J. R. Forsythe, general manager, *Keystone Coal Buyers Manual*, told a meeting of central Pennsylvania coal operators last summer:

"The possibility of coal setting up marketing shops in the front yards of primary oil and gas marketing strongholds may emerge as a distinct eventuality in a few years. A number of major electric utility companies are studying the possibility of supplementing oil and gas with coal. The result could be the partial capture of such undreamed-of markets as Florida, Louisiana, Texas, Oklahoma and California. Developments show that Florida's utilities already plan to burn 2 million tons a year by 1961, with a potential of another 10 million."

While new opportunities open for coal in oil and gas territory, trends in long-range price increases continue to favor coal over gas and oil. In the 5 yr, 1952-56, delivered fuel costs at steam electric plants (including handling costs at the plant) rose more sharply for oil and gas than coal. Details are given in the following:

Costs Per Million Btu, Cents

	Total U. S.		Coal-Consuming States*	
	1952	1956	1952	1956
Coal	27.3	28.1	27.3	28.1
Oil	33.1	37.9	35.3	40.5
Gas	14.5	18.5	19.8	23.4

*Excludes Florida, Mississippi, Arizona, West South Central and Pacific regions.

Not evident in the table and less favorable to coal is this fact. Comparing 1956 to 1955, gas costs edged up only 0.5c in "Total U. S." and 0.2c in "Coal-Consuming States." In the corresponding catergories, coal costs advanced 2.9c.

Looking ahead, coal has a clear-cut advantage over competing fuels in ability to keep prices down. Higher exploration, labor and other production costs for oil and gas can only be absorbed through price rises in their products. On the other hand, coal's past record in increasing productivity and the very real prospects for raising output per man day significantly in the immediate future should certainly enable coal to absorb all or most of its higher production costs in the next 5 to 10 yr.

Output per man day for all coal mines rose from 6.77 tons in 1947 to an estimated 11 tons per day last year. During the next 8 yr, or by 1965, most industry analysts figure 16 tons per man day is within reach.

Take a hypothetical example of coal's ability to absorb increased production costs on the basis of 11 and 16 tons per man day in 1957 and 1965, respectively. If it could be conceived that miners' daily wages could move up from $22.45 per day in 1957 to $32.64 per day in 1965, labor cost per ton would remain at $2.04. Of course, higher costs for other items in the production bill—for example, machinery and supplies—would have to be weighed into the picture. But the degree to which these items offset gains in labor productivity would be relatively minor.

The upshot: as coal realizes its potential for increased labor productivity, its price advantage over competing fuels will widen. In turn, the stage will be set for coal to pick up at least a modest share of the electric power market now held by oil and gas.

The Job Ahead: Check Capacity; Extend Research

In a previous article, *Coal Age* presented a 14-point program for combatting competition in the electric power market (June, 1957, p 59). Among the recommendations were adequate capacity planning and an enlarged research effort. Both of these merit special emphasis.

On capacity planning, there is a vital need for adjusting coal's percentage depletion allowance. Queried by *Coal Age* on the matter, one prominent industry spokesman said:

"You should stress the importance of coal operators and manufacturers being allowed sufficient depletion on the one hand, and quick depreciation on the other, so as to be able to finance their organizations to meet, say, 322 million tons by 1967. I am pretty well convinced that unless something strenuous is accomplished the coal industry is going to have difficulty meeting utility coal needs in 1967 which will be more than double those of 1956."

On capacity planning also, coal must seriously consider whether or not today's prices for utility coal permit adequate realization per ton for expanding tonnage to meet tomorrow's power plant needs.

If prices are too low—and this seems to be prevailing industry experience and opinion—a campaign should be started to sell power plant buyers on their self-interest in fairer prices. Without a rapprochement of interest, both industries stand to lose out as utilities' fuel needs soar to levels far beyond the supply capacity of competitive energy sources.

In research, coal should collaborate more closely with utilities on projects of strong mutual interest. These might cover the gamut of activities involved in producing, transporting and using coal energy. More specifically, they might cover, for example, long-range supply problems, gasification and gas turbine research, lower cost transport, better combustion techniques, improved fly ash control and disposal, and more active study of the potentials for electric home heating.

Fortunately, some start in closer collaboration was made in the formation of a 7-man Coal-Utility Committee, Aug. 14, 1956, chairmanned by J. E. Tobey, president, Appalachian Coals, Inc., and first vice president, Bituminous Coal Research, Inc. In several meetings, the committee has discussed a cooperative research program proposed by BCR.

Results so far are "modest in scope consisting of three projects relating to atmospheric pollution and fly ash utilization." Prospects for an expanded program, however, are encouraging. On Sept. 23, 1957, the Association of Edison Illuminating Companies pledged financial support and the Edison Electric Institute indicated it would probably share in the cost of the program.

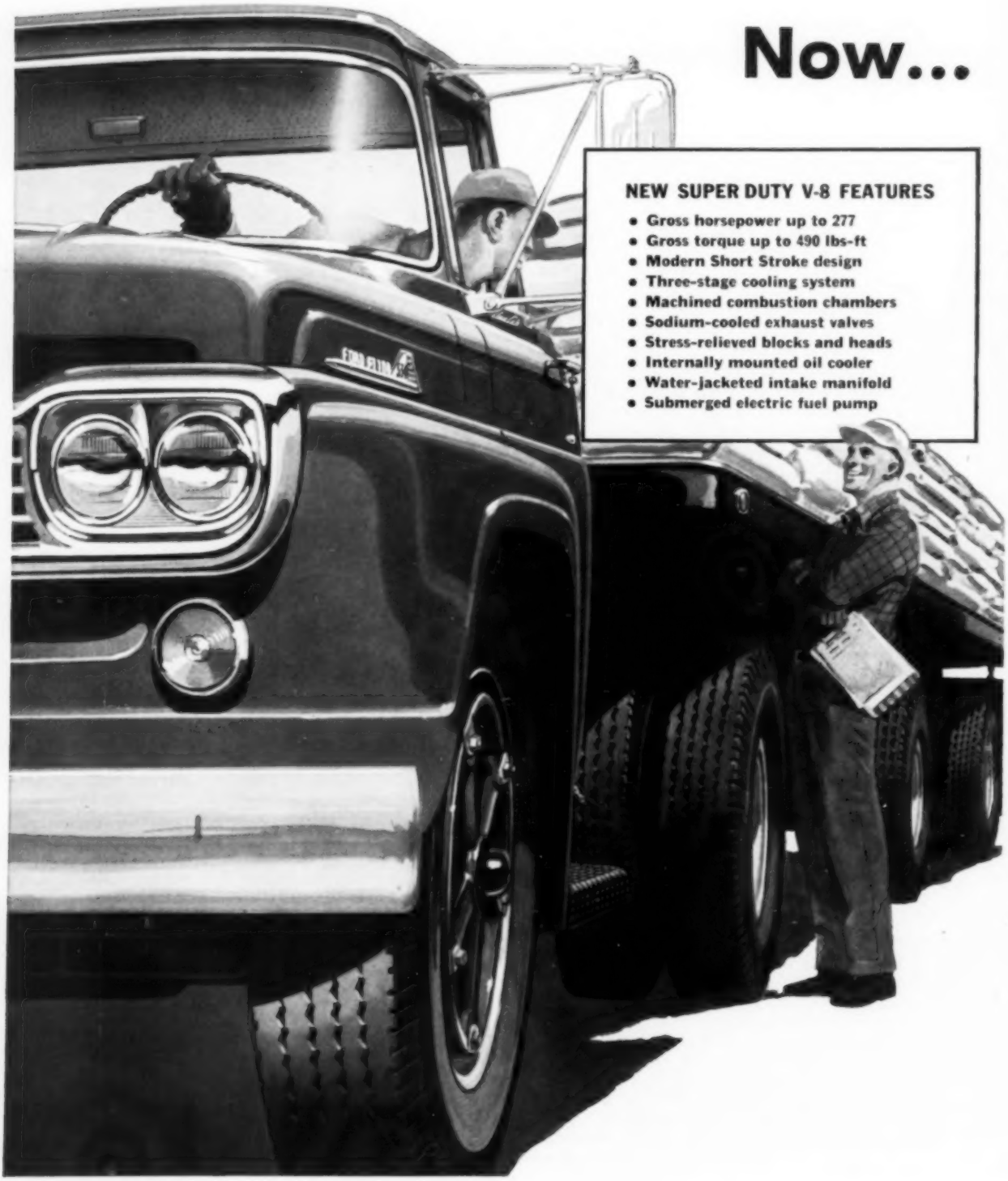
How 53 Major Electric Utilities See Coal Use 1957-61

	Burn in Thousands of Tons				
	1957	1958	1959	1960	1961
NEW ENGLAND					
New England G. & E.	151	291	356	363	389
Western Mass. E.	500	719	719	700	700
Conn. Lt. & Pwr.	1,310	1,250	1,423	1,613	1,706
MIDDLE ATLANTIC					
Atlantic City Elec.	625	656	713	776	826
Jersey Central Pwr. & Lt.	665	695	784	777	...
Public Serv. E. & G.	2,353	2,472	3,000	3,500	4,200
L. I. Lighting	1,230	1,250	1,400	1,650	2,000
Rochester G. & E.	745	745	820	902	990
Central Hudson G. & E.	350	360	393	566	586
Rockland Lt. & Pwr.	192	226	154	124	100
N. Y. State E. & G.	1,514	1,566	1,616	1,668	1,718
United Gas & Imp.	205	210	210	218	230
Pa. Elec.	2,257	2,317	2,349	2,753	2,753
Phila. Elec.	4,015	3,920	4,110	4,300	4,490
EAST NORTH CENTRAL					
Central Ill. Pub. Serv.	1,200	1,200	1,300	1,400	1,500
Electric Energy	3,180	3,180	3,180	3,180	3,180
Central Ill. Lt.	810	880	905	995	...
Illinois Pwr.	1,540	1,798	1,947	2,119	2,321
Pub. Serv. of Ind.	2,464	2,628	2,728	2,877	3,092
So. Ind. G. & E.	495	535	560	560	560
Northern Ind. Pub. Serv.	648	772	918	1,075	1,101
Ind.-Ky. Elec.	4,150	4,150	4,150	4,150	4,150
Detroit Pub. Lt. Comm.	186	176	182	195	200
Detroit Edison	5,700	5,880	6,100	6,400	6,670
Cinn. G. & E.	2,082	2,061	2,185	2,240	2,370
Cols. & So. Ohio	1,246	1,320	1,400	1,484	1,573
Cleveland Elec. Illum.	2,850	3,100	3,200	3,500	3,900
Dayton Pwr. & Lt.	1,160	1,240	1,280	1,410	1,510
Ohio Valley Elec.	3,000	3,000	3,000	3,000	3,000
Madison G. & E.	220	240	259	279	301
Lake Superior Dist. Pwr.	140	150	160	172	185
Wisconsin Pwr. & Lt.	641	681	735	790	850
Wisconsin Elec. Pwr.	2,577	2,588	2,743	2,880	3,053
WEST NORTH CENTRAL					
Interstate Pwr.	368	427	454	485	520
Iowa So. Util.	288	294	314	337	345
Northern States Pwr.	950	1,020	1,130	1,240	1,350
Minn. Pwr. & Lt.	428	480	530	580	630
Kansas City Pwr. & Lt.	1,225	1,352	1,384	1,496	1,629
Mo. Pwr. & Lt.	135	130	125	100	100
Union Electric	2,808	3,944	4,278	4,689	4,866
Omaha Pub. Pwr. Dist.	165	207	181	180	210
SOUTH ATLANTIC					
Del. Pwr. & Lt.	459	409	443	480	490
Potomac Elec. Pwr.	1,639	1,700	1,740	1,770	1,850
Monongahela Pwr.	1,618	1,500	1,475	1,550	2,000
Duke Pwr.	3,825	4,200	4,500	4,700	4,900
Carolina Pwr. & Lt.	1,364	1,623	1,747	1,820	1,988
South Carolina Pub. Serv.	200	270	295	320	350
Gulf Pwr.	215	219	336	386	...
EAST SOUTH CENTRAL					
Louisville G. & E.	1,018	1,225	1,400	1,575	1,750
Kentucky Util.	844	919	935	1,000	1,060
MOUNTAIN					
Montana-Dakota Util.	386	420	460	500	560
Pub. Serv. of Colo.	397	450	513	578	651
TVA	18,000	19,500	20,000	22,000	24,000
PROJECTED U. S. TOTAL	162,000	173,700	183,100	196,100	205,900

Estimates of utility coal consumption listed are as reported to *Keystone Coal Buyers Manual*, October through November, 1957. Projected totals are based on tonnage reported by 92 utilities which accounted for about 55% of utility coal burned in 1957.

Big new FORD

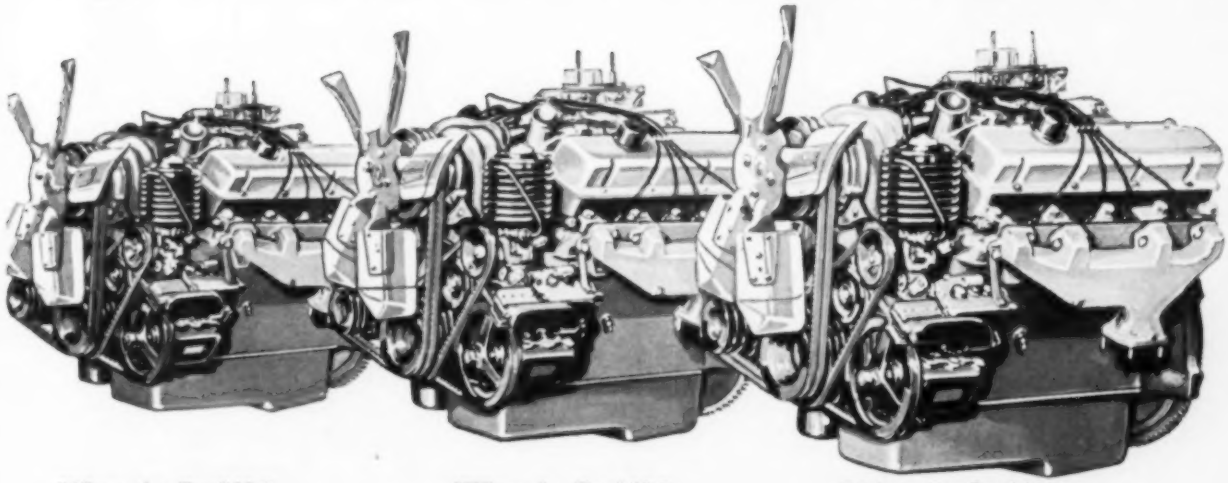
Now...



NEW SUPER DUTY V-8 FEATURES

- Gross horsepower up to 277
- Gross torque up to 490 lbs-ft
- Modern Short Stroke design
- Three-stage cooling system
- Machined combustion chambers
- Sodium-cooled exhaust valves
- Stress-relieved blocks and heads
- Internally mounted oil cooler
- Water-jacketed intake manifold
- Submerged electric fuel pump

super duty V-8's up to 534 cu. inches!



401-cu. in. Ford V-8
Maximum horsepower—226.
Torque: 350 lbs-ft @ 1800 to 2300 rpm.

477-cu. in. Ford V-8
Maximum horsepower—260.
Torque: 430 lbs-ft @ 1800 to 2300 rpm.

534-cu. in. Ford V-8
Maximum horsepower—277.
Torque: 490 lbs-ft @ 1800 to 2300 rpm.

10 BIG NEW EXTRA-HEAVY TRUCK SERIES

GVW's up to 51,000 lb. For '58, ten new basic series are added to Ford's already extensive Heavy and Extra Heavy Duty line. Four new Tilt Cabs, four new Conventionals, and two new Tandem models offer GVW ratings up to 51,000 lb.

GCW's up to 75,000 lb. New T-950 Tandem is rated for 75,000-lb. GCW. Biggest single-rear-axle models are rated for 65,000-lb. GCW.

Front-axle capacities up to 15,000 lb. Choice of three front axles in most new Ford Extra Heavies. Rated capacities of 9,000, 11,000 and 15,000 lb.

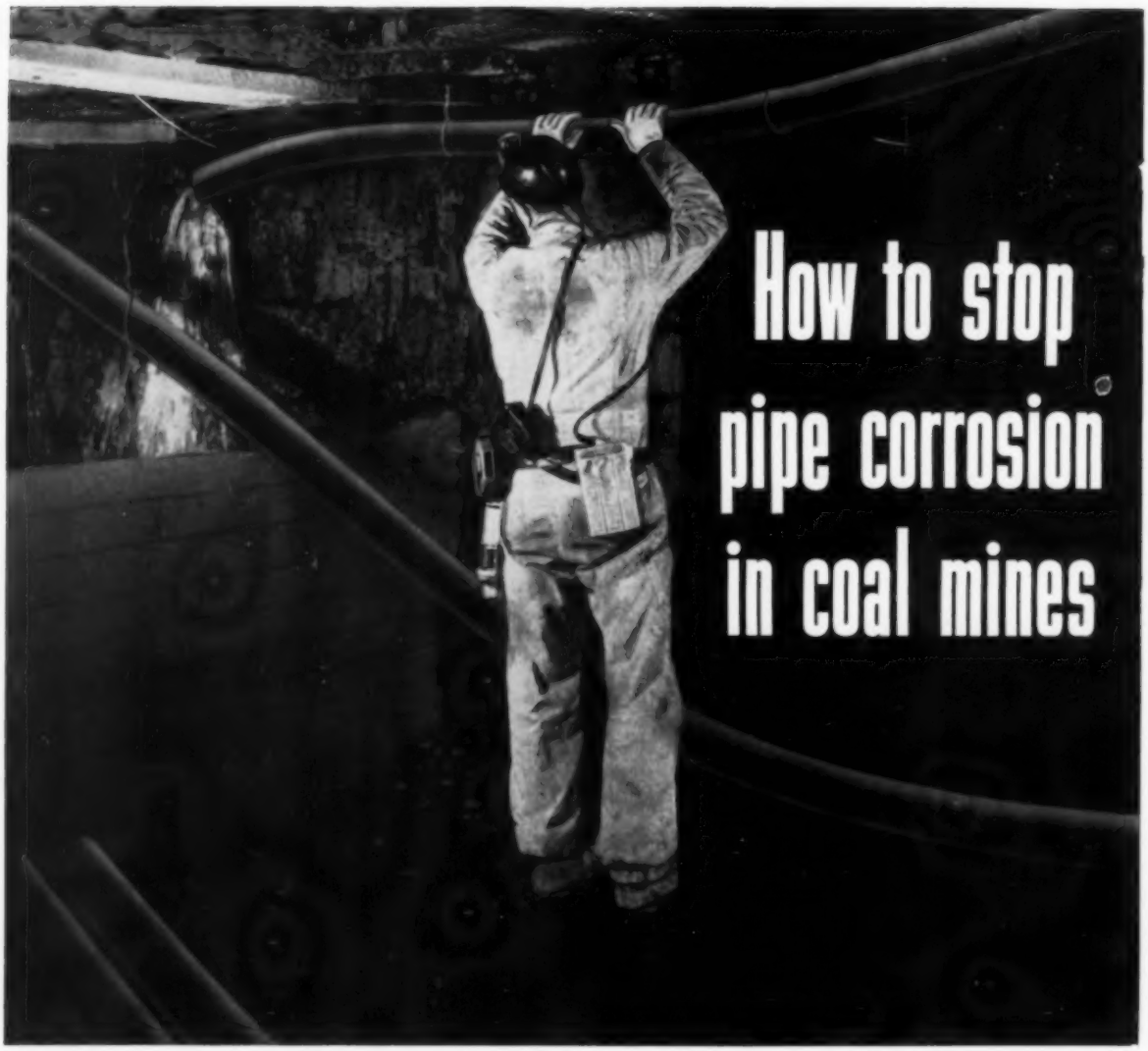
Rear-axle capacities up to 29,000 lb. Wide choice of rear axles includes single-speed and two-speed, single reduction and double reduction types. Capacities range from 18,000 lb. to 29,000 lb.

Bogie-axle capacities up to 38,000 lb. For '58 there are *five* Ford basic tandem axle models. Biggest of the *five* is the brand-new T-950 which features a tandem rear-axle assembly rated for 38,000 lb. Other bogie-axle capacities range down to 22,000 lb. for Ford Series T-700.

New transmissions. Roadranger transmission available in all ten new Ford Heavies. Up to 33% less shifting. Engines operate in peak horsepower range, use less fuel. "Short Fourth" transmissions also available on "F" and "C" Series.

FORD TRUCKS COST LESS

LESS TO OWN... LESS TO RUN... LAST LONGER, TOO!



How to stop pipe corrosion in coal mines

Simple. Use USS NATIONAL* Polyethylene Pipe. Mine water has no effect on it. Acids, alkalis, salts and most chemicals are helpless against its tough, inert composition. So, you install it once and forget about it.

Tough and flexible

NATIONAL Polyethylene Pipe won't crack from rough handling, even at low temperatures. And it remains rugged and flexible over its entire working range from −90°F. to +120°F.

Light and workable

A coil of NATIONAL Polyethylene Pipe can be carried on the shoulder. It unrolls like hose, turns corners, goes over or under obstructions. Easily joined with insert-type fittings, secured with stainless steel clamps. All types of fittings available for any layout.

Manufactured from pure 100% "on grade" polyethylene raw material, USS NATIONAL Polyethylene Pipe is available in sizes from ½ inch to 6 inches in diameter, in a variety of wall thicknesses. For full details, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

*Trademark

This seal of the National Sanitation Foundation means Tested . . Approved . . Sanitary!

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH 30, PA
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS NATIONAL **Polyethylene** PIPE

UNITED STATES STEEL

"CONTINUOUS" HAULAGE

FOR "CONTINUOUS" MINING

ENTERPRISE HAULAGE EQUIPMENT

MINE CARS (4-Axle Cars, Thru-Axle Cars, 8-Wheel Cars)

- End Dump Cars
- Side Dump Cars
- Bottom Dump Cars
- Rotary Dump Cars

EQUIPMENT HANDLING CARS
MAN-TRIP CARS

"Your cars custom-engineered for your specific needs"

ENTERPRISE WHEEL & CAR CORPORATION

BRISTOL, VA.-TENN. • HUNTINGTON, W. VA.

Sam Pulaski
(1833-)

Sam Pulaski is a wise old gent,
smart as any the Lord ever sent.
His job is the same day after day—
blasting down mountains the same old way.

But there's a story to this old guy
on why he'll use Austin 'til he die.
It started back before you and me,
as far back as eighteen thirty-three.

That was the year when Sam was the one
chosen to see the canal was done.
Canal was complete 'cept for a hill
bigger'n McKinley and steeper still.

Though Sam took the job he felt quite sad,
knew he needed more strength'n twenty had.
But Sam had heart and this was his tune,
"Get me some help and get it here soon."

As fate would be, Austin caught the cry
and filled his wagon near to the sky
with explosives aplenty, fuse galore
to trample trouble that lay before.

First went the mountain almost as fast
as Austin took to make up the blast.
Then boulders were made stones and stones sand
when Sam and Austin went through the land.

The canal was done in less'n a day
and still flows freely or so some say.
But this to Sam and his roughneck friend
was just the beginning, not the end.

To blast, to prime, to clip or to drill,
for every need Pulaski must fill
he's called on Austin since thirty-three,
quite a record I think you'll agree.

* * *

Now if you quarry or work a mine,
you must use products in our line.
So why not follow Sam's tested lead—
buy from Austin . . . everything you need.

USED IN 1833 AUSTIN EVER SINCE

AUSTIN POWDER COMPANY
CLEVELAND 13, OHIO

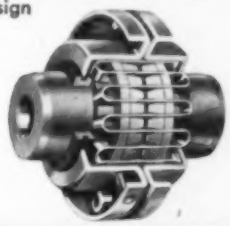
How one FALK coupling saved more than $1,000 per month

Pictured below is a Falk Steelflex Coupling assembly which connects a 2500 hp motor to a reduction unit driving an 18" bar mill in a Midwestern steel plant. This coupling replaced another type which broke repeatedly, causing maintenance expense averaging $1,000 a month—plus costly production losses. Since installation of the Falk Coupling, with its controlled torque mechanism that disengages when a predetermined overload occurs, there has been no interruption of production. Savings in maintenance and in lost production time are well in excess of $1,000 per month...dramatic proof of the importance of coupling design!

Long coupling life is not the sole criterion of coupling performance. Inadequate shaft couplings may be the cause of bearing damage or shaft breakage on your machines. If so, a change to Falk Steelflex will give twofold protection to your connected machines: (1) compensation for reasonable degrees of shaft misalignment, and (2) torsional resiliency to reduce peak loads as much as 30%. These advantages are as important to you as the long service life of the Falk Steelflex Coupling itself.

Falk Steelflex Couplings, in types and sizes to meet virtually all industrial applications, are promptly available from distributor, warehouse and factory stocks. Consult your Falk Representative or Authorized Falk Distributor.

Basic **Type F**—cutaway view showing exclusive grid-groove design



THE FALK STEELFLEX ...a truly flexible coupling

Here is the coupling that has all the strength of steel, yet is truly flexible. *More than a million* have been bought for industrial service of many kinds.

Because, in addition to its inherent superiorities of design, the Type F Steelflex can be used horizontally or vertically without modification or special parts, it has been adopted as standard in many plants—and by many designers and manufacturers of industrial equipment...Write for Bulletin 4100.

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives and Distributors in many principal cities

Good couplings not only connect machines; they prolong machine life and boost production!

BETTER MINING PLANS and tighter controls were worked out by industry engineers in 1957 in their efforts to realize more of the productive potential of modern mining equipment. Back-up services were refined to support face operations.

1957 Developments in Mining

In deep mining:

Increasing use of continuous mining, better servicing, more attention to operating standards and controls.

In stripping:

Larger shovels, improved drilling and blasting of overburden, increased augering.

In preparation:

New drying and tabling equipment, increased economy in plant design, stainless-steel sheathing.

Deep Mining

BETTER MINING PROJECTIONS for achieving maximum results from continuous mining began to take on form and substance in 1957. Reports from a number of progressive mines demonstrated that it is possible to attain high recovery at a high rate of production when machines available today are carefully evaluated in terms of the conditions under which they will operate. One good example of the productivity levels that can be reached is described in the article beginning on p 124 in this issue.

However, high productivity does not automatically follow, even though the best possible mining machine has been selected to cope with existing face conditions. It is the back-up services that really govern, and 1957 was a year of solid gains in devising better ways to service the actual coal-winning operation at the face. There was increasing interest in using AC power at the face because of its economy and the relative ease with which AC rotating equipment can be maintained. More of the rope-belt conveyors, extensible and stationary, were placed in service to keep transportation systems up to the necessary capacity with a minimum of conveyor-supply handling. And 1957 saw the mining-company development in the Midwest of the "Whatnik," a self-propelled, extensible bridge conveyor for transporting coal from the discharge boom of a continuous machine to the room conveyor in pillar-recovery work.

Tying all these elements together into an effective production organization was a job for engineers especially trained in setting up production standards and operating controls. The list of companies making excellent use of this kind of engineering skill grew longer in 1957. The result was that more companies realized more of the potential of modern machines.

Updated Methods

Specific examples of the gains that can be made and how they were achieved include the following:

Modernization was the keynote at

DEEP RIPPING of exposed coal seams, prior to loading, was an innovation in stripping which meant real savings to a number of operators.

and Preparation

a large mine in Illinois, where ropebelt conveyors were installed to take the coal away from boring-type mining machines. The results are a peak production of 700 tons per unit shift in headings and 1,180 tons per unit shift in pillar retreat. The mining plan, which was carefully worked out as preparations for continuous mining were made, includes the practice of driving pairs of long rooms on close centers, then retreating the relatively wide pillar. Increased recovery is an additional benefit, as pointed out in a full description of the operation in the February, 1957, issue of *Coal Age*, p 76.

Operations in thin seams can be productive when proper equipment and good mining plans are dovetailed (see *Coal Age*, April, 1957, p 60). At this Kentucky mine, conventional off-track equipment was teamed with conveyors and bridge conveyors in a well-designed room-and-pillar system to attain a productivity of from 17 to 19 tons per face man per shift in a seam ranging from 26 to 36 in thick. Spare units and special supply tractors helped make this record.

An Alabama mine increased capacity 300% in a single year without undue complications (*Coal Age*, May, 1957, p 84) by adding conventional units on a predetermined timetable. Eight mechanical units, operating on three shifts, now produce 1,584,000 tons annually, against the 588,000 tons formerly produced. Much of the success of this expansion is attributable to foresighted development work, in which main entries were driven to provide access to large areas of recoverable coal. Most of the present development work is done by continuous miners, leaving the wide work for the conventional units.

Reports from western Pennsylvania told of increasing activity in applying continuous miners in pillar-recovery work, with proponents lining up for both pocket-and-fender and open-end methods. Local roof conditions dictated the method to be used in most instances. In any event, there was solid proof that close study of methods followed by a willingness to try new approaches, pays off in increased productivity.

Promises of further gains in productivity for the industry as a whole were contained in some of the new machines unveiled in 1957. A number of low-height continuous-mining machines were introduced at the American Mining Congress Coal Show at Cleveland in May. New high-capacity shuttle cars and AC-powered cars were shown. With travel time still a major consideration in obtaining maximum overall efficiency, one manufacturer went to the drawing board and the assembly floor to produce a vehicle that will carry 13 men, a unit crew, to the working section in a short time. Constant improvement was the byword, in roof-bolting machines, utility and supply trucks, self-propelled compressors, circuit breakers and other underground units.

Improved Auxiliaries

Possible applications for industrial television in today's coal mines began to show up in 1957. In one such application, a camera was aimed at a skip-unloading point and the associated receiver was placed at the operator's control station. The result was the elimination of a need to have a man constantly in attendance at the unloading point with the main duty of merely watching for possible blockages in the skip.

Also placed in service in 1957 was a new hydraulic-oil filter, featuring a visible warning device which tells when the filter element should be changed. In another departure from long-standing practices, a number of mines were using tapered-shank cutting bits on continuous machines. Among the major advantages offered by the new bit design was the time-saving opportunities when a change of bits is required. There are no set screws to be loosened because the bits are removed by driving a wedge through special openings in the bit holder or under the projections at the bit heads.

A jointed roof auger was developed to permit the insertion of longer augers in started roof holes where 6-ft bolts are required (*Coal Age*, June, 1957, p 108). Among the patents awarded in 1957 were some for systems of walking roof supports. The units usually include a pair of supports connected in such a manner that a controlled advance of one support may be made while the other is carrying a roof load.

Increasing application of chain conveyors was noted in the anthracite

region to transport coal in gangways in steeply-pitching veins. It was also reported that shuttle cars and loading machines had been applied successfully at two anthracite properties.

A freshening interest in the possibility of using auxiliary fans to provide better ventilation at continuous-mining faces was evident, and a new inertial-type unit was undergoing tests to determine its effectiveness as a dust precipitator and air mover for such face applications.

Production Standards

Terms like production standards, operating controls, methods studies and industrial engineering received more emphasis in 1957. Management felt an increasing need to know what constitutes a good day's work for modern machines and trained crews. The need for tighter control of production activities reflects the ever-increasing sales of continuous-mining machines, as shown in the survey of 1957 equipment sales in this issue.

Industrial - engineering programs were refined to insure due consideration of all special conditions, peculiar to coal mining, that may affect standards and controls. One outcome of this activity has been a rise in the number of specialized training courses for mine personnel, particularly maintenance men. A number of companies in 1957 initiated intensive training, sometimes on company time, in efforts to upgrade mechanics and electricians.

Stripping

A NEW KING of stripping shovels was crowned in 1957 when the first 70-yd unit went to work in Illinois. Several more of the gigantic machines, now being erected at other mines, will go into service in 1958. Progress continued to be made in overburden drilling techniques as more versatility and better controls were built into new vertical machines. Drilling progress also was marked by the introduction of the first commercial horizontal rotary dry-type machine capable of boring a 9-in hole 48 ft deep with only one drill stem. Another step forward in horizontal drilling and blasting methods was the application of a mechanical loading and tamping machine to speed these operations in horizontal holes.

New Bituminous Preparation Facilities

Coal Company	Plant Location	Capacity, TPH	Preparation Equipment
Alabama Power Co.	Gorgas, Ala.	600	McNally Pittsburg[1]
American Coal Co. of Allegany County	Deerfield, W. Va. (2)	50	Deister Concentrator[2]
Amherst Coal Co.	Slagle, W. Va.	325	McNally Pittsburg[1]
Amigo Smokeless Coal Co.	Amigo, W. Va.	150	Fuel Process[3]
Armco Steel Corp.	Montcoal, W. Va.	150	Jeffrey[3]
	Montcoal, W. Va.	400	Kanawha[4]
Badger Coal Co.	Philippi, W. Va.	75	McNally Pittsburg[1]
Berwind-White Coal Mining Co.	Windber, Pa.	370	Roberts & Schaefer[5]
		139	Link-Belt[6]
Bethlehem Mines Corp.	Nanty Glo, Pa.	...	Industrial Engr.[19]
Bolt Mining Co.	Bolt, W. Va.	300	Daniels[11]
Boone County Coal Corp.	Sharples, W. Va.	...	Kanawha[12]
Brule Smokeless Coal Co.	Otsego, W. Va.	110	Robert Holmes[13]
Cambria-Clearfield Mining Co.	Westover, Pa.	150	Roberts & Schaefer[14]
Carbon Fuel Co.	Winifrede, W. Va.	10	McNally Pittsburg[15]
Chafin Coal Co.	Rita, W. Va.	300	McNally Pittsburg
Christopher Mining Co.	Buckhannon, W. Va.	200	Roberts & Schaefer[14]
Clear Creek Coal Co.	Clearco, W. Va.	130	Kanawha
Clinchfield Coal Corp.	Clintwood, Va.	500	Heyl & Patterson[17]
	Clinchfield, Va.	1,125	Link-Belt[18]
			Elmco[18]
	Dola, W. Va.	320	Industrial Engr.[19]
Colorado Fuel & Iron Corp.	Pueblo, Colo.	20	Roberts & Schaefer[20]
Consolidation Coal Co.	Byrne, W. Va.	550	Industrial Engr.[21]
Conemaugh Mining Co.	Seward, Pa.	500	Kanawha[22]
Copperhead Coal Co.	Sugar Creek, Ohio	...	Heyl & Patterson[23]
Crozer Coal & Land Co.	Lynco, W. Va.	240	Fuel Process[24]
Dawson Collieries, Inc.	Dawson Springs, Ky.	200	Daniels[11]
Dawson Daylight Coal Co.	Dawson Springs, Ky.	200	Daniels[11]
Eastern Gas & Fuel Assoc.	Barrett, W. Va.	14	Dorr-Oliver[25]
	Eccles, W. Va.	175	Roberts & Schaefer[11]
			Daniels[11]
	Grant Town, W. Va.	850	Industrial Engr.[26]
	Wharton, W. Va. (7)	150	Kanawha[27]
			Deister Concentrator[27]
Edith Faye Coal Co.	Grundy, Va.	75	Jeffrey[27]
Elk Creek Coal Co.	Emmett, W. Va.	78	Link-Belt[6]
	Hurley, Va.	250	Irvin-McKelvey[28]
Enos Coal Mining Co.	Oakland City, Ind.	1,000	Templeton-Matthews[29]
Galloway Land Co.	Dawmont, W. Va.	240	Fuel Process[24]
Gunn-Quesaly Coal Co.	Quesaly, Wyo.	80	Roberts & Schaefer[14]
Guyan Eagle Coal Co.	Amherstdale, W. Va.	150	McNally Pittsburg[30]
	Elk Creek, W. Va.	100	McNally Pittsburg[30]
Hanna Coal Co.	Moundsville, W. Va. (2)	50	Deister Concentrator[2]
	Moundsville, W. Va.	30	Peterson Filters[31]
Harlan Collieries Co.	Brookside, Ky.	200	Daniels[11]
Harlan Fuel Co.	Yancey, Ky (3)	75	Deister Concentrator[2]
Hi-Hat Elkhorn Mining Co.	Hi-Hat, Ky.	...	Kanawha[32]
			Elmco[32]
Highland Coal Co.	Whitewood, Va.	150	Daniels[11]
Imperial Colliery Co.	Burnwell, W. Va.	250	Daniels[11]
Imperial Smokeless Coal Co.	Quinwood, W. Va.	...	Kanawha[33]
Island Creek Coal Co.	Algoma, W. Va. (7)	150	Deister Concentrator[34]
	Holden, W. Va.	25	Roberts & Schaefer[14]
	Ragland, W. Va.	110	McNally Pittsburg[27]
			Elmco[27]
	Red Jacket, W. Va. (5)	100	Wilmot[35]
			Deister Concentrator[34]
	Red Jacket, W. Va.	13	Dorr-Oliver[25]
	Verdunville, W. Va.	120	McNally Pittsburg[15]
	Wyoming, W. Va. (5)	125	Deister Concentrator[2]
	Wyoming, W. Va. (13)	100	Dorr-Oliver[25]
	Wyoming, W. Va.	100	Link-Belt[6]
Jamison Coal & Coke Co.	Fairview, W. Va. (14)	300	Deister Concentrator[34]
J. E. B. Pocahontas Coal Co.	Bramwell, W. Va.	50	Fuel Process[24]
Jewell Ridge Coal Corp.	Jewell Valley, Va. (3)	50	Roberts & Schaefer[14]
			Heyl & Patterson[17]
			Deister Concentrator[27]
Johnstown Coal & Coke Co.	Beaverdale, Pa.	100	Western Machinery[12]
Kaiser Steel Co.	Raton, N. Mex.	65	Jeffrey[24]
Knife River Coal Co.	Beulah, No. Dakota	440	McNally Pittsburg[14]
	Savage, Montana	200	McNally Pittsburg[14]
Leechburg Mining Co.	Salina, Pa.	40	Jeffrey[15]
Leetown Coal Co.	Grundy, Va.	75	Jeffrey[27]
Little Dog Coal Co.	Gillespie, Ill.	12	Deister Concentrator[27]
Lorado Coal Mining Co.	Lorado, W. Va.	48	Kanawha[15]
Lynnville Coal Co.	Lynnville, Ind.	700	McNally Pittsburg[17]
Mary Gail Coal Co.	Manchester, Ky.	300	McNally Pittsburg[17]
Mrak Coal Co.	Eska, Alaska (1)	25	Deister Concentrator[2]
Nassau Coal Co.	Pageton, W. Va.	65	Roberts & Schaefer[14]
Omar Mining Co.	Stirrat, W. Va.	250	Heyl & Patterson[15]
			McNally Pittsburg[15]
			Deister Concentrator[15]

Contracted for in 1957*

Coal Company	Plant Location	Capacity, TPH	Preparation Equipment
Panther Coal Co.	Bluefield, W. Va.	200	Daniels[11]
	Roseann, Va.	70	Fuel Process[47]
Paragon Jewell Coal Co.	Whitewood, Va.	75	Jeffrey[37]
Peerless Coal & Coke Co.	Kimball, W. Va. (2)	50	Deister Concentrator[2]
Pittsburgh Coal Co.	Westland, Pa.	...	Fairmont[49]
Pocahontas Fuel Co.	Amonate, Va.	17	Daniels[46]
	Bishop, Va.	200	Daniels[11]
	Itmann, W. Va. (3)	75	Deister Concentrator[2]
	Jenkinjones, W. Va. (3)	233	Fairmont[11] Dorr-Oliver[11] Deister Concentrator[11]
	McComas, W. Va.	90	Daniels[15] Deister Concentrator[15]
	Pocahontas, Va. (6)	175	Deister Concentrator[2] Fairmont[2]
Powhatan Mining Co.	Powhatan Point, Ohio	500	Kanawha[16]
Premier Pocahontas Co.	Herndon, W. Va.	65	Roberts & Schaefer[14]
Republic Steel Corp.	Fredericktown, Pa.	...	Heyl & Patterson[54]
Richland Coal Co.	Barbourville, Ky.	35	Wilmot[55]
Royalty Smokeless Coal Co.	Cliff Top, W. Va.	60	McNally Pittsburg[9]
Russell Fork Coal Co.	Elkhorn City, Ky. (5)	50	Deister Concentrator[2]
	Elkhorn City, Ky.	...	Dorr-Oliver[56]
Saginaw Dock & Terminal Co.	St. Clairsville, Ohio	125	Robert Holmes[13]
Slab Fork Coal Co.	Alpoca, W. Va.	85	Kanawha
	Alpoca, W. Va.	75	Daniels[11]
	Mary Gaston, W. Va. (3)	250	Kanawha[17] Jeffrey[57]
	Slab Fork, W. Va.	3	Kanawha[15]
Squaw Creek Coal Co.	Boonville, Ind.	750	McNally Pittsburg[18]
Thunderbird Collieries Co.	Farmersburg, Ind.	600	McNally Pittsburg[18]
United Pocahontas Coal Co.	Crumpler, W. Va.	65	Wilmot[55]
United States Pipe & Foundry Co.	Maben, Ala.	13	Deister Concentrator[2]
United States Steel Corp.	Clairton, Pa.	27	Paterson Filters[22]
	Gary, W. Va. (72)	800	Deister Concentrator[58]
	Wellington, Utah (21)	225	Deister Concentrator[58]
Universal Coal Corp.	Richlands, Va.	75	Jeffrey[37]
Utility Coal Co.	Marion, Ill.	275	Daniels[11]
Westmoreland Coal Co.	Hampton, W. Va.	150	Heyl & Patterson[47] Eimco[47]
		550	Heyl & Patterson[59] Industrial Engr.[59] Jeffrey[59] Dorr-Oliver[59] Eimco[59]
West Virginia-Kentucky Coal Co.	McAndrews, Ky.	180	Daniels[11]
Weyanoke Coal & Coke Co.	Arista, W. Va. (1)	13	Deister Concentrator[2]
Williams River Coal Co.	Cowen, W. Va.	150	Roberts & Schaefer[14]
Winding Gulf Coals	McAlpin, W. Va.	300	Kanawha
	Tams, W. Va.	4	Kanawha[60]
Wingert Contracting Co.	Sligo, Pa.	150	Irvin-McKelvey[61]
Wyatt-Seaner Coal Co.	Saltsburg, Pa.	300	Daniels[11]
		150	Roberts & Schaefer[14]

*Includes contracts for installation of new preparation equipment in existing structures. Where more than one equipment item was installed, the number, when known, is shown in parentheses following the plant address.

1. Including McNally Mogul cleaning and Dryclones. 2. Concenco "77" Diagonal-Deck coal washing tables. 3. Including McNally-Norton jig and classifying equipment, and fine-coal flash drying (190 tph). 4. M-6 heavy-media system. 5. Jeffrey Baum jig equipment.

6. Additional washing facilities and 750-ton Armco storage bin and auxiliaries. 7. Including McNally fine-coal jig. 8. Hydrotator (150 tph) and Super Airflow equipment (200 tph). 9. Heat dryers. 10. Joy Microdyne dust-collector installation.

11. Including DMS dense-media washer. 12. Coal-storage system with two 200-ton circular bins. 13. Baughman Verti-Vane drying equipment. 14. Super-Airflow equipment. 15. Including concentrating tables.

16. Including Hydro-separator and Super-Airflow equipment. 17. Reineveld centrifugal dryers. 18. Preparation plant including heavy media concentrating tables, thermal drying and crushing and Agidisc filter. 19. Crushing and rescreening plant (200 tph), and drying plant with two Baughman Verti-Vane dryers (120 tph). 20. Including Denver Sub-A froth flotation cells.

21. Raw-coal storage and blending plant. 22. Coal-handling facilities. 23. Preparation plant including ORC jig, Reineveld dryers and H&P cyclones. 24. M-8 heavy-media system. 25. 75-ft Dorr thickener.

26. Dumping, hoisting and conveying facilities. 27. No. 100 unit washery. 28. Complete tipple, including Neff & Fry silo. 29. Storage (3,000 tons) and reclaiming facilities including Hewitt-Robins conveyors, Jeffrey feeders and Armco storage bins. 30. Refuse-crushing and material-handling system.

31. Fine-coal centrifugal dryers. 32. Peterson filter with provision for adding disc. 33. Water-clarification and fine-coal circuit, including H&P cyclones, and Eimco Agidisc filter. 34. Coal- and rock-dust collecting system. 35. Concenco revolving feed distributors and Concenco "77" Diagonal-Deck coal washing tables.

36. Including Dorr-Oliver thickener and filter and CM1 centrifugal dryer. 37. Including McNally Tromp dense-media washers and two Eimco Agidisc filters. 38. Including Concenco revolving feed distributors and Concenco "77" Diagonal-Deck coal-washing tables, (80 tph). 39. American disc filter with Swing Agitator. 40. 19-ft horizontal filter and 12 Dorr-Clones for preclassification. 41. 50-in Beiknap calcium-chloride washer. 42. Including Wemco Mobil-Mill (180 tph), Concenco distributor and Concenco "77" tables (50 tph). 43. Refuse-washing equipment, including ORC jig, dewatering screen and H&P cyclones. 44. Including raw-coal crushing, screening and loading. 45. Diaphragm-jig equipment.

46. Water-clarification and fine-coal recovery circuit, including H&P cyclones. 47. Rotary breaker and ROM screening. 48. Including 2 Concenco distributors, 20 SuperDuty No. 7 Diagonal-Deck tables, thermal drying. 49. Including rotary dump, feeders, conveyors, crusher and bin. 50. Froth-flotation plant with vacuum filter.

51. Plant addition including Dorr thickener and Fluo-Solids drying system with vacuum filter, and 3 Deister double-deck tables (75 tph). 52. Fine coal plant including SuperDuty tables (50 tph). 53. River-loading plant. 54. Cyclones and auxiliaries. 55. Hydrotator equipment.

56. Dorr 135-ft thickener and HX classifier. 57. Jeffrey jig and 2 Reineveld dryers. 58. Including McNally Giant Washer. 59. Including scalping screens, Jeffrey jig, tables, Reineveld dryers, H&P cyclones, Eimco filter and 95-ft Dorr thickener. 60. Cyclone installation.

61. Including dense-media vessel. 62. Including 6 Concenco "77" Diagonal-Deck washing tables and 1 Concenco distributor. 63. McNally Norton jig and classifying equipment. 64. Addition to diaphragm jig. 65. Concenco revolving feed distributors.

66. Fine coal plant, including tables, Eimco Agidisc filter, H&P cyclone, Reineveld dryer and thermal dryer (80 tph). 67. M-3 heavy media system. 68 Including concentrating tables and fine-coal thermal drying.

New techniques were developed for getting better results with ammonium-nitrate-based mixtures as operators continued to search for lower cost in rock breaking. Gains also were registered in haulage units, with the introduction of a 600-hp engine to power a 40-ton rear-dump unit.

Drilling and Blasting

As the pace quickened in handling overburden, more attention was focused on drilling and blasting methods. Vertical rotary units handled a major portion of the drilling assignments in thick, tough cover. At one Pennsylvania mine a new rotary machine, replacing two truck-mounted units, broke a drilling bottleneck that prevented effective use of an 18-cu yd shovel. Features of the new machine include hydraulic power for all motions; infinitely variable speed rotation from 0 to 152 rpm; automatically controlled constant pressure on the bit; crawlers that can be driven in opposite directions at the same time for fast moving; and a 55-ft mast making possible a 50-ft hole in one pass (*Coal Age*, February, 1957, p 98).

At an Alabama mine versatility was provided by mounting a vertical drill on a wide-gage tractor with a dozer blade at one end. This unit cuts its own drill road and also has a built-in water system to supress dust (*Coal Age*, June, 1957, p 60).

A major development in horizontal drilling was the application of the first commercial rotary dry-type drill to bore 9-in holes to a depth of 48 ft with only one drill stem. Capable of penetrating shale at the rate of 50 fpm, the unit is operated by one man. It produces a clean, smooth hole in solid material and permits easy loading of explosives only slightly smaller than hole size. (*Coal Age*, October, 1957, p 98).

As further evidence of progress in

drilling and blasting practices, a mechanical tamping device was introduced at an Illinois mine. One man in four days, single shift, does what it took two men five and six days to do. The machine also permits greater flexibility in mining operations because blastholes can be loaded after the full width of the cut is removed.

Progress continued in the development of explosives and blasing agents. For example, various methods of mixing fuel oil and ammonium nitrate and placing it in blastholes were tried. Sometimes they were mixed in a plant and packaged either in polyethylene or plastic-lined burlap bags and then hauled to the drill site. Other times, 50-lb bags of the ammonium nitrate were hauled to the drill site and oil was poured over the material in open bags a short time before holes were charged. The loose mixture was poured into the hole and detonated similarly to the bagged product. At some operations the oil and ammonium nitrate were poured into the hole at the same time. One company in Ohio learned that the detonating speed of ammonium nitrate and fuel oil could be increased by adding large-diameter detonating fuse in the hole (*Coal Age*, December, 1957, p 89).

Removing Overburden

Stripping ratios continued to grow at both shovel and dragline operations. The latest answer to the problem of handling thicker cover in area stripping is the new 70-cu yd shovel. And the possibility of building a shovel with a 100-yd dipper has not been ruled out.

With the application of 7,200-V power to the 70-yd shovel as well as 6,900 V to the earlier 60-yd machine, the higher voltages appear to be established as the standard of the future. At the moment, voltage in the range of 13,000 seems to be ruled out because of the greatly increased cost of equipment and the problem of insulation.

Aside from advances in larger shovels, the wheel continued to be applied successfully where natural conditions permitted, in the Midwest.

Flexibility rated top consideration in the selection of equipment for mountain-top stripping or where tracts of land were fairly small and scattered. A new 10-yd dragline, reported to be the largest mounted on a single pair of crawlers, went into service at an Illinois mine. Designed with faster line speeds in the hoist and drag motions, plus faster propel, the unit takes a wide cut and piles the spoil high (*Coal Age*, September, 1957, p 74).

NEW PREPARATION PLANT in Illinois features stainless-steel sheathing.

To achieve maximum utilization of available spoil room and facilitate backfilling, perpendicular cuts across islands and on inside curves are made at an Ohio operation. This method also helps balance the thicker and thinner cover on every cut. (*Coal Age*, May, 1957, p 92).

In general, where flexibility and frequent moves were important factors, draglines were favored. Diesel-powered machines were popular at small- or medium-sized operations because moves could be made without handling power lines.

Use of special steels and alloys continued to grow in buckets, dippers and other parts of the stripping units where light weight and strength are desirable.

Big, powerful bulldozers saw increasing service both as stripping units and as auxiliaries in pit clean-up work. They also carried a major portion of the work in backfilling. A new job assignment for bulldozers was added in 1957 when a hydraulic ripper was used to break coal at a Missouri mine. In periods when not ripping, the tractor uses the bulldozer blade for general work.

At one Pennsylvania mine where stripping is done without blasting, three bulldozers are teamed with a 2½-yd shovel to cut down 30 to 40 ft of cover. The remaining 40 ft is taken by a 9-yd diesel-powered dragline (*Coal Age*, April, 1957, p 66).

At another operation, 60 ft of cover is taken in mountain top stripping. Big bulldozers cut down the top layer and push it into the pit for easy handling by the stripping unit (*Coal Age*, March, 1957, p 82).

Tractor shovels, motor graders and power sweepers continue to perform a wide variety of tasks at stripping operations. Graders worked in the pit and on haulage roads while the other two machines were confined primarily to pit work.

In coal haulage, trucks continue to lead. At smaller operations or where winding mountain roads had to be traveled, end-dump units were the choice. But for off-highway service at large mines, tractor trailers were favored. Attention again was focused on good roads that would permit trucks to travel safely at high speeds.

Augering

H ghwall augering moved forward again in 1957. Originally used as a follow-up unit in stripping, the auger also sees service at deep-mine properties and as an independent operation. The year also saw the introduction of the twin-head machine for doubling output from 24- to 32-in beds. Recently published figures show that the average thickness of auger-mined coal is between 50 and 55 in and that augers produce better than 6 million tons of coal per year.

Output per manshift continues high with augers, with the best figures being offered by units operating in thick coal. Production usually was carried out five days a week, and in some instances coal was stockpiled and loaded at a convenient time. Augering depth depended on conditions at the individual properties. When augering was done to recover coal between the outcrop and old mine workings holes were drilled to the caved area and hole depth varied accordingly. In general, augering did not extend beyond 200 ft.

Stripping Auxiliaries

Auxiliary services during the past year were designed to help keep production equipment operating at peak efficiency. Good communication between equipment operators, shop and supervisors was stressed as more companies relied on short-wave radios at widely scattered operations to improve maintenance and supervision. Various types of recording devices continued to make gains as effort continued toward reducing down time and pin-pointing the causes of delays.

New Anthracite Preparation Facilities in 1957*

Coal Company	Plant Location	Capacity, TPH	Preparation Equipment
Apex Coal Co.	Ranshaw Pa.	60	Menzies Engr.[1]
Coal Castle Fuel, Inc.	Minersville, Pa. (2)	24	Deister Concentrator[2]
Colitz Coal Co.	Pottsville, Pa.	125	Wilmot[3]
Diamond Coal Co.	Mt. Carmel, Pa.	50	Western Machinery[4]
	Mt. Carmel, Pa.	150	Menzies Engr.[5]
D & Z Coal Co.	Weigh Scales, Pa.	120	Menzies Engr.[1]
Glen Alden Corp.	Audenreid, Pa. (4)	300	Wilmot[6]
Glosek Bros.	Shamokin, Pa.	25	Wilmot[7]
Gowen Coal Co.	Fern Glen, Pa.	120	Menzies Engr.[1]
Heidelberg Sales Co.	Avoca, Pa.	24	Deister Concentrator
Jeddo-Highland Coal Co.	Midvalley, Pa. (3)	150	Wilmot[8]
Kocher Coal Co.	Valley View, Pa.	150	Western Machinery[9]
Moffat Coal Co.	Taylor, Pa.	250	Menzies Engr.[1]
Peca Bros Coal Co.	Mahanoy City, Pa. (3)	36	Deister Concentrator[2]
Pine Ridge Mining Co.	Ashland, Pa.	150	Western Machinery[10]
Reidinger Coal Service	Paxinos, Pa.	60	Menzies Engr.[1]
Rosini Coal Co.	Shamokin, Pa.	24	Deister Concentrator[2]
Strohecker Coal Co.	Elizabethville, Pa.	60	Menzies Engr.[1]
Swatara Coal Co.	Minersville, Pa.	35	Western Machinery[4]
Tunnel Ridge Coal Co.	Auburn, Pa. (7)	40	Deister Concentrator[11]

*Includes contracts for installations of new equipment in existing structures. Where more than one equipment item was installed, the number, when known, is in parentheses following the plant address.

1. Menzies heavy-media system. 2. Concenco revolving feed distributors. 3. Heavy-media system with OCC vessel. 4. Fine-coal plant, including Wemco Fagergren cells, Hydroseparator and auxiliaries. 5. Complete design for plant to handle Buckwheat Nos. 4, 5, 6. 6. Two heavy-media systems, Hydrotator and Hydrotator classifier. 7. Type A jig. 8. Concenco "77" Diagonal-Deck coal-washing tables. 9. Fine-coal plant with Hydrotators, Hydrotator classifier and froth flotation. 10. 2-compt. Wemco heavy-media drum. 11. 2 Concenco distributors and 5 SuperDuty tables.

Preparation

ACTIVITY in coal preparation during the past year was marked by major gains in heavy media and wet tables. Emphasis on recovery of extreme fines increased as more companies added cyclones, vacuum filters and flotation units. Other units registering gains included jigs, centrifugal and thermal driers. And raw-coal storage facilities were added to increase flexibility in preparation by permitting independent operation of mine and plant. More coal moved to market by barge as more plants were located near rivers.

New Plants

More emphasis on operating at peak capacity without interruption was noted at many plants in the past year. The aim was to keep coal flowing constantly at a uniform rate regardless of whether coal was being delivered from the mine. At some mines this was achieved with raw- and clean-coal stockpiles and at others with only raw-coal storage.

At a new mine in western Kentucky, clean coal is stored in a 12,000-ton stockpile for later barge loading. In addition to providing maximum flexibility, a big advantage of clean-coal stockpiling is the natural dewatering that takes place.

Simplified gravity flow of raw coal and belt transportation of refuse and clean coal contribute to smooth plant operation at another company. Another feature of the plant is a pair of fine-coal jigs designed by the company's preparation engineer (*Coal Age*, June, 1957, p 74).

At another new mine in western Kentucky, a new-type washer handles 750 tph of raw coal. The unit features a rearrangement of the washing cells designed to greatly increase the capacity without increasing the difficulty of controlling transverse impulse distribution, which has been a major problem in Baum jigs as the width of the washing compartment was increased. It also has a compound circuit whereby crushed middlings are treated in a separate compartment with independent control of separation and products disposal. (*Coal Age*, June, 1957, p 84).

At a West Virginia mine, a new heavy-media washer features a built-in drain screen and a flow-distributing device which can be adjusted to provide a uniform density throughout the solution. Automatic controls are incorporated to maintain a constant specific gravity of solution (*Coal Age*, August, 1957, p 62).

In Illinois, a significant savings in construction costs was made by building a simplified preparation structure using a minimum of steel. Erected along the railroad tracks instead of over them, the plant height is only sufficient to house the washbox with a dragtank under it at ground level. There are no internal conveyors (*Coal Age*, September, 1957, p 74).

In West Virginia a triple shuttle-belt loading system was employed to eliminate construction of a bridge, large fill and railroad extension. The system permits 60 railroad cars to be loaded without moving them once they have been placed by the switching engine. Another feature of the plant is the application of a new-type of centrifugal drier that produces a minimum of fines in the process.

Cleaning Facilities

A wide variety of cleaning units was installed throughout 1957. Gains were marked up for dense-media systems, jig washers, upward-current equipment and wet tables. Crushing and recirculation of middlings continued to be popular as coal companies exerted more effort to recover as much coal as possible. Flexibility of flow after coal left the preparation units was stressed at plants serving a wide variety of customers.

PAYLOADER®

Developments (*Continued*)

Rotary breakers and large-capacity crushers were installed in increasing numbers to break raw coal down to sizes that could be handled by the cleaning units. Secondary crushing also gained in reducing middlings for recirculation.

Wet tables, especially the new double-deck units and flotation cells registered gains as fine-coal cleaners. And cyclones, filters and vibrators continued popular for recovery of extreme fines and water clarification.

The first twin-deck washing tables went into service in 1957 and at the end of the year a total of 3,625 tph of capacity of these units was delivered or on order. Features of the new table include double feed capacity per unit of floor space; elimination of impact to the supporting structure; and halving of laundering, piping, wiring and connected power requirements. Smaller, lighter and less costly table plants are the end result.

A new concept in table driving mechanism permits the twin-deck unit to be completely suspended by wire ropes. The drive consists of simple rotating eccentric weights in an unusual arrangement that emphasizes their impulses in the horizontal plane, eliminates them in the vertical plane and combines with these the necessary differential action. Less than 3 hp is needed for its operation.

Thickeners and filters also made additional gains in the refuse circuit as more effort was made toward preventing solids from entering streams as well as conserving water. The use of flocculants grew in the past year to speed settling of solids in thickeners.

Mechanical and thermal drying advanced throughout the year, with mechanical units being used separately or in combination with thermal machines to dry the finer sizes.

An innovation in drying fine coal was noted in the past year with announcement of the first system that will dry filter cake as part of the $^{3}/_{8}$x0 feed material. Approximately 40 tph of filter cake will be included in a total of 230 tph of feed to the drying system.

During the past year announcement also was made of a new agitator-type disk filter that is said to increase filter capacity and decrease maintenance needs. The agitating mechanism is designed to keep solids in the pulp in suspension and thereby get more uniform cake distribution.

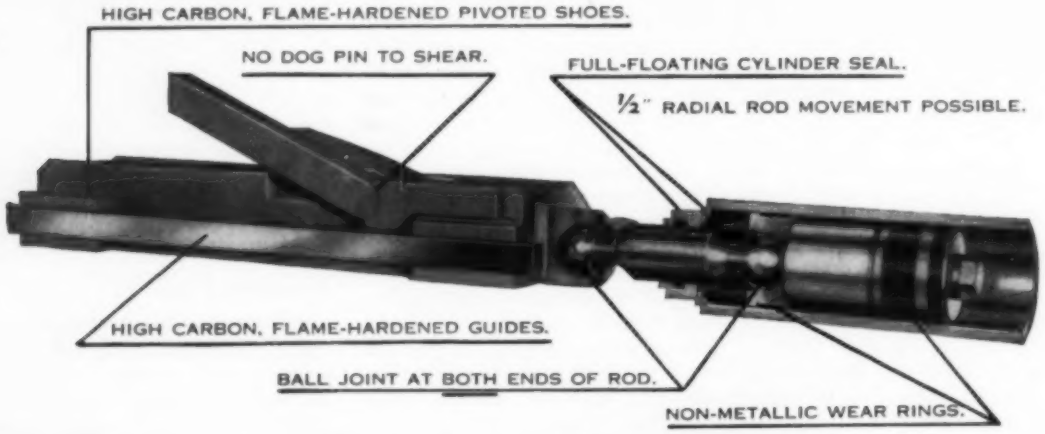
A new fine-coal jig that requires no artificial bed material has successfully completed 3 yr service at plants in Kentucky and Oklahoma (*Coal Age*, October, 1957, p 94).

The first commercial jig in the U. S. using feldspar as a bedding material was placed in service late in 1956 and was put through a series of experimental tests in 1957.

Stainless steel took on a new role in 1957 when it was used to sheath a 1,000-tph preparation plant in Illinois. Owners of the mine chose stainless steel for the plant exterior because it requires little maintenance and is resistant to corrosion (*Coal Age*, October, 1957, p 108).

Here's why STAMLERS are BEST!

STAMLER EXCLUSIVE PATENTED FEATURES PROVEN AND UNCHANGED FOR 8 YEARS!

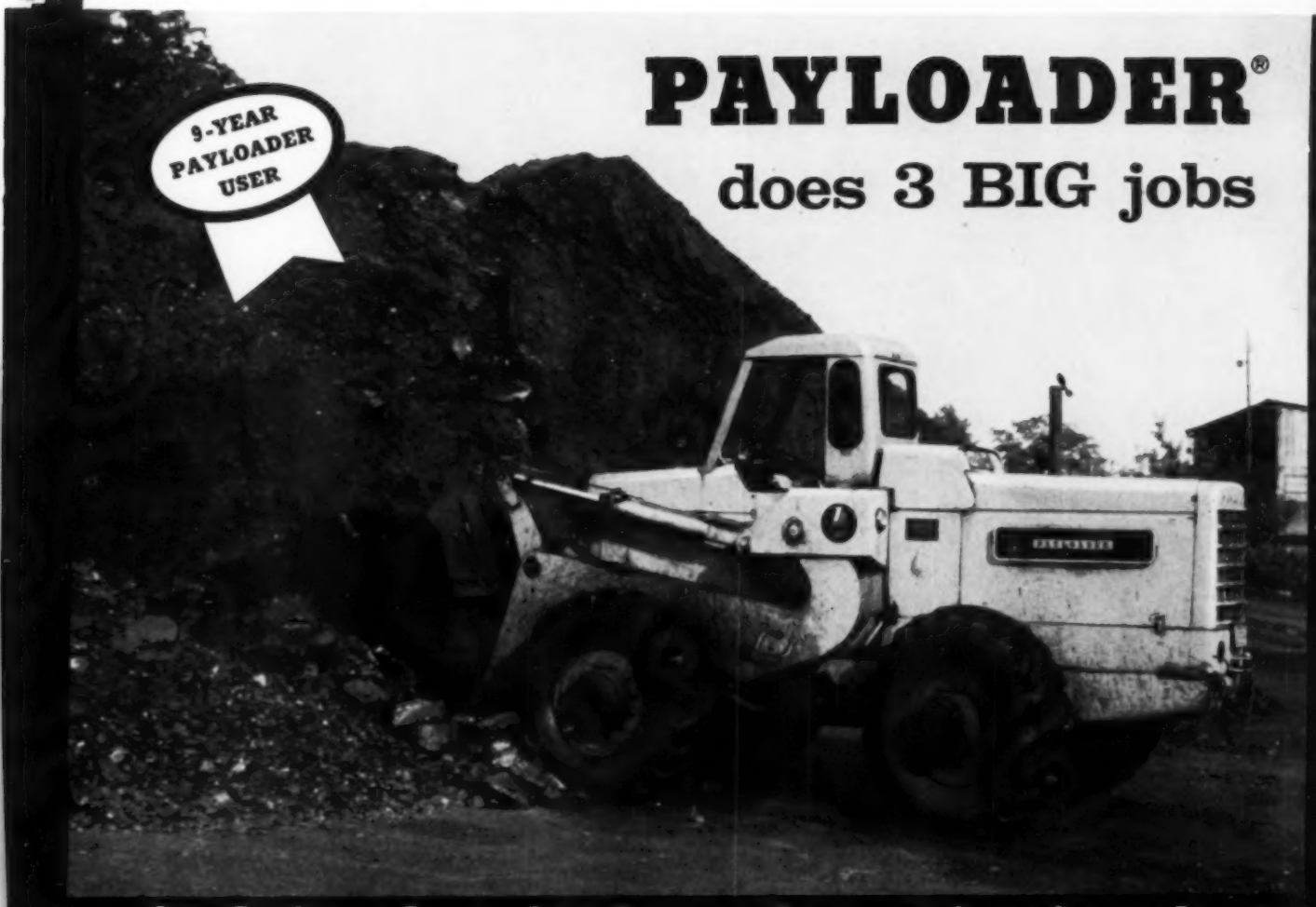

HIGH CARBON, FLAME-HARDENED PIVOTED SHOES.
NO DOG PIN TO SHEAR.
FULL-FLOATING CYLINDER SEAL.
½" RADIAL ROD MOVEMENT POSSIBLE.
HIGH CARBON, FLAME-HARDENED GUIDES.
BALL JOINT AT BOTH ENDS OF ROD.
NON-METALLIC WEAR RINGS.

STAMLER Hydraulic CAR SPOTTERS

Remember... STAMLER has built NOTHING BUT Car Spotters since 1949!

W. R. STAMLER CORP., PARIS, KENTUCKY

SCHROEDER BROTHERS, Exclusive Eastern Sales Agent, Pittsburgh, Pennsylvania • SALMON & CO., Birmingham, Alabama
UNION INDUSTRIAL CORP., Carlsbad, New Mexico • WESTERN SALES ENGINEERING CO., Salt Lake City, Utah



PAYLOADER®
does 3 BIG jobs

feeds breaker · loads trucks · maintains plant

"We like our Hough model HO 'PAYLOADER' because it is fast and power-packed to get the job done on a time-saving schedule. It is our fourth HOUGH used in the operation since 1949. We particularly like the large 4-yd. bucket. On several occasions the machine has loaded out 33 truck loads of graded coal, averaging 22-tons each, in an eight-hour day in addition to its breaker-charging duties."

That is R. W. Rissinger, Plant Manager for Kocher Coal Company at Goodspring, Penna., expressing their satisfaction with the big model HO "PAYLOADER." It loads out trucks from stockpile and does general plant maintenance but its main job is to feed the 250-ton-per-hour breaker from a stockpile, supplementing the direct truck deliveries.

Owners and drivers alike recognize and acknowledge the superior performance and handling ease of 4-wheel-drive "PAYLOADER" tractor-shovels — the result-getting output that Hough experience and "know-how" has built into them. They feature the exclusive standard hydraulic-load-shock-absorber, power-transfer differentials, "no-stop" power shift transmission, planetary final drives, power-steer, 4-wheel power brakes.

Contact your Hough Distributor— let him prove on *your* operation that a "PAYLOADER" can out-produce any comparable size of tractor-shovel.

Modern Materials Handling Equipment

THE FRANK G. HOUGH CO.

LIBERTYVILLE, ILLINOIS

SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

PURCHASE AND HOUGH LEASE PLANS

Now your Hough Distributor has at his disposal the broadest and most complete set of financing plans ever offered: — TIME PAYMENT . . . LEASING PLANS*, with or without OPTION TO PURCHASE — any and all kinds of financing to best fit your needs for the purchase of "PAYLOADER" equipment. See him today.

** (Available in Continental U.S.A.)*

THE FRANK G. HOUGH CO.
735 Sunnyside Ave., Libertyville, Ill.

Send more data on 4-wheel-drive "PAYLOADER" tractor-shovels as checked:

- ☐ HO - 9,000 lb. Carry Cap. (1 to 4 cu. yd. buckets)
- ☐ HH - 7,000 lb. Carry Cap. (⅞ to 3¼ cu. yd. buckets)
- ☐ HU - 5,000 lb. Carry Cap. (¾ to 2½ cu. yd. buckets)

Name.....

Title.....

Company.....

Street.....

City..... State.....

2-8-7

Trends in Coal Mining Today and Tomorrow

A roundup of significant developments affecting the coal-mining picture today, and which will continue to affect it tomorrow.

Standards and Production Control

Production standards being increasingly established by time study and job analysis, either by special departments where companies are large enough, or by employing outside firms specializing in such work.

Trend toward incentives for supervisors strengthening in the industry with the growth in establishment of scientific production standards. Establishment of incentives for miners also receiving increased consideration.

Opening and Development, Deep Mines

Slopes firmly in favor as the main openings for mines where hoisting must be done. Belt conveyors the practically universal hoisting medium in such slopes, and are installed in increasing lengths for increasing lifts.

Loaders and conveyors the major tools for sinking belt and other moderate-pitch slopes. Rock loaders and extensible belts are new contenders promising a substantial increase in sinking speed.

Drilling to outline shallow shafts and decrease shooting burden and shock to walls a growing practice, along with mucking with clamshells.

Overshot loaders and tractor shovels operated by air or electric motors coming to the front for mucking in large shafts for ventilation, access and the handling of men and materials.

Drilling of auxiliary shafts for ventilation and handling men and supplies a growing practice.

Retreat systems, either full or modified (advance on one side and retreat on the other, or retreat within panels, as examples) now practically universal in new layouts.

Wider use of bridge conveyors and continuous miners resulting in a trend to a smaller number of headings in development work.

Continuous Mining

Growing rapidly, with new high-capacity machines providing tonnages equal to or better than those from good loading-machine setups with one-quarter to one-half less men.

Boring units finding rapidly increasing acceptance in thick and thin coal.

Shortwall and planer-type mining-and-loading units growing in use in thin coal, and being joined by new low-type mobile machines, some with adjustable heads, thus giving the low-vein operator a much wider choice of equipment.

Conveyor transportation with bridge and extensible units increasing.

Full retreat in panels more common, with advance on one side and retreat on the other equally popular. Bleeder openings incorporated in practically all plans. Right-angle or 90-deg plans most common even with fixed-head or semi-rigid continuous miners. Pillaring scheduled for almost all continuous-mining setups, with open-ending a fairly popular system with operating men in many mining areas.

Production with ripper-type continuous units proved feasible in two bituminous operations with pitches up to 15 deg.

Future Possibilities

Level Coal—A major expansion in the use of remotely controlled boring-type miners, reflecting in part design of control units for application underground. These, in low-height designs, may be one answer to the problem of continuous mining in coal under 3 ft in thickness.

Pitching Coal—More use of continuous machines in light-pitch coal after development methods are changed to accommodate them; more longwalling in light pitch with longwall-type continuous miners.

Jet mining with high-pressure water (*Coal Age*, November, 1957, p 80).

SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY
2-8-7

Conveyor and Machine Loading

Hand-loaded and self-loading conveyors being more and more limited to very-thin coal or special conditions. Retreat on both sides of a panel the most-common conveyor plan.

Standard line of loading machines for normal thicknesses of coal being expanded by units with capacities up to 15 tpm for very-thick coal, and by thin-vein units for coal as low as 28 to 30 in. Increase in the availability of the thin-vein units altering significantly the basic production picture in such veins. Bridge conveyors growing as a means of insuring high productivity through continuous haulage, especially in the thinner seams. Otherwise, shuttle cars get the call.

Block plans with bleeder openings becoming more popular. "Flat" or low-angle pillar lines finding wider application.

Longholing continuing to gain as a means of mining heavily pitching veins.

Face Preparation

Rubber-tired universal machines taking over more and more of the cutting load. Bar length increasing.

Hand-held drill use upped by development of flexible-shaft and hydraulic-powered units.

Millisecond delay shooting increasing.

Future Possibilities

New materials for cutter and drill bits, including heat-treated glass. Developments for cutting and drilling will also find application in continuous mining.

Roof Control

Quantity and quality of support per ton of coal steadily increasing.

Bolting, now used for over half the output, continuing to increase.

More emphasis being placed on the design of bolting and other support systems to cut the cost of supports while still providing the required protection.

Recovery of timber and bolts being increasingly practiced where conditions permit such recovery with safety.

Special equipment and plans being evolved to provide support in continuous mining without interrupting production.

Future Possibilities

Bonding of roof by injecting an epoxy resin or other material to convert the top into a beam or plate similar to plywood (see p 124 of this issue).

Increased use of European-developed types of steel posts and supports.

Transportation, Deep Mines

Torque-converter and straight AC shuttle cars cut investment and operating costs at the face and bring the full AC mine appreciably closer.

Extensible conveyors continue to mark up rapid gains in serving face units, and are making it possible to drive places up to 1,000 ft deep. With cornering equipment, the range of advance is upped sharply and the time required for adding and substracting belt sections is materially reduced.

Automatic trip-moving and loading stations becoming more numerous.

Big cars and locomotives continue gains in rail haulage.

Rope units making rapid headway in the conveyor-haulage field.

Portal relocation increasingly practiced to cut travel time and add to efficiency in the handling of men and supplies.

Future Possibilities

Diesel mainline haulage to clear away the last obstacle to complete AC mining underground.

Pumping of coal from face to preparation plant.

Pneumatic or hydraulic hoisting of coal.

Ventilation

Developing for 100% continuous production and roof-bolting results in simplified lower-cost main ventilation. Quantity requirements are scaled up but concentrated production eases air handling.

Positive direction of the air to face, particularly in continuous-miner places, being increasingly emphasized. Brattice lines the most widely used means.

(Continued on p 110)

Bleeder openings being incorporated into most new mining plans to permit one-way air travel and better conditions in gobs. Escape and inspection of worked-out areas also are facilitated.

Increasing number of plans provide for bringing air up the center headings in gaseous mines, splitting both ways across the faces and returning through outer headings.

Future Possibilities

Dual blower-exhauster setups to really insure ventilation of continuous-miner faces.

Automatic systems for continuous methane detection, particularly in continuous-miner places, possibly with provisions for cutting power automatically when methane content exceeds a predetermined limit.

Pumping and Drainage, Deep Mines

Wider use of borehole-and-pump combinations for more-economical mine drainage reflects better drilling methods and equipment.

Automatic control of pumps continues to grow as labor for attendance rises in price.

Cooperative pumping stations being increasingly employed to prevent rehandling water several times at different properties.

Thin-walled metal tubing with embossed grooves for coupling, thus saving the weight of metal necessary for threads or conventional grooves, gaining ground rapidly for water handling.

Electric Power, Deep Mines

AC expected to grow rapidly in the next few years because (1) AC motors, controls and substations cost less, (2) AC equipment maintenance is simpler (3) AC is more versatile and (4) the advent of the torque-converter and straight AC shuttle cars eliminates the need for DC for face haulage. Approval of the use of diesel locomotives for mainline haulage would clear the way for complete conversion to AC. Meanwhile, a number of mines plan to use AC for everything but mainline rail haulage.

Transmission voltages tending to increase. The trend is toward 4,160 V, with some mines using 7,200.

Future Possibilities

A further upping of transmission voltage to 13,000 as concentration, loads, and transmission distances increase.

Strip Mining

Completion of the first 70-yd shovel in Illinois marks a new milestone in stripper size. Present 60-yd machines have proved themselves by moving over 2,000,000 cu yd per month.

Dragline size and use continue to increase, particularly where flexibility and long range are required.

Worker comfort and ease of operation stressed in design of cabs and controls on new stripping units.

Dry-type vertical rotary drills continue to gain in the field of overburden preparation.

Dry-type sidewall rotary capable of drilling deep holes with only one stem change opens up new field for sidewall units. (*Coal Age*, October, 1957, p. 98).

Introduction of new-type blasting agents continues, with commercial-grade ammonium nitrate sensitized with oil leading. Elimination of the primer the goal with one new agent.

Installation of the first mechanical hole tamper ushers in new era of hole preparation (*Coal Age*, September, 1957, p 88).

Oil retarders gain for automatic braking of new types of trucks.

Turbochargers increasingly employed to boost the horsepower of diesel engines.

Parallel operation of transformers for portable power distribution systems successfully passes test.

Capacity of highwall augers for thin seams boosted with introduction of twin-head unit.

Future Possibilities

Construction of an 80-yd or larger shovel and a 40-yd or larger walking dragline within 5 yr.

Construction of a 100-ton coal hauler within 5 yr.

Upping of voltage to 13,000 for new large excavators.

Wider use of industrial-engineering techniques for analyzing operations and setting production standards.

Development of special tools and devices for handling parts as stripping machines grow in size.

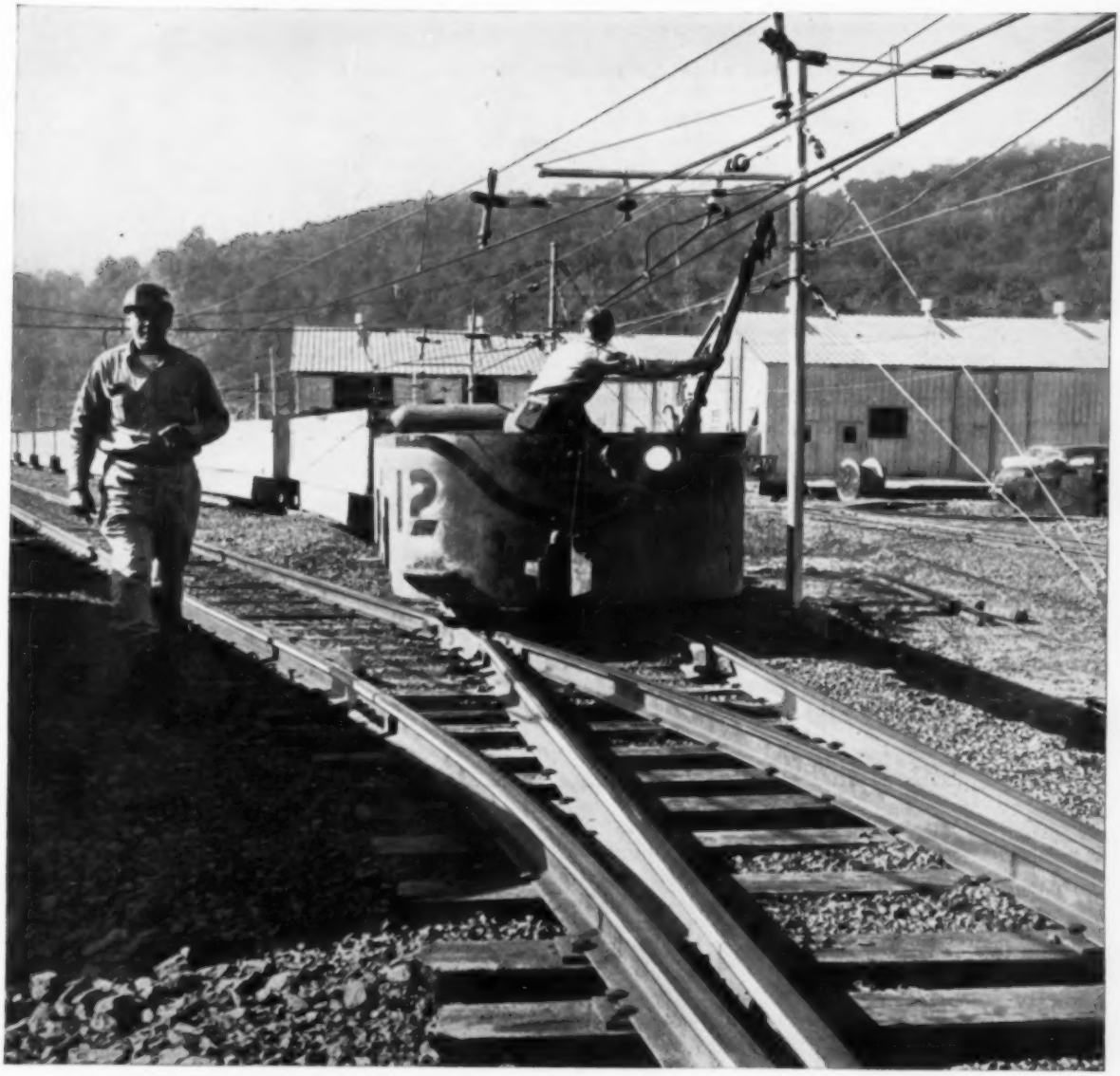
Blow charging of explosives into shot holes, particularly of the sidewall type.

Preparation

Storage facilities for both raw and clean coal being installed at an increasing number of mines.

Facilities for complete recovery of useable material—coal, near-gravity material and fines—being included in an increasing number of plants, with emphasis on fine-

(Continued on p 112)



To keep coal moving fast call in a Bethlehem trackwork engineer

Our long experience in trackwork planning and fabrication includes some of today's top-notch haulage systems. We offer this experience to you.

Our first step, after being invited in, will be to make a detailed study of your workings. After that comes a huddle amongst our trackwork specialists. From that session will emerge a working plan tailored to your needs and based on first-hand knowledge of those needs.

After your approval of our plans, our rail mills and fabricating shops go into action. Every bit of trackwork is carefully preassembled, every detail checked and re-checked, before a single rail arrives at your location. When the materials do arrive, you can then be sure of proper fit and easy installation.

Strange as it might seem, such a layout actually costs less in the long run than a "do-it-yourself" project. A Bethlehem layout often pays for itself in a year or so. The first step costs you nothing; just call or write our nearest district office and a Bethlehem engineer will be on his way. Why not get started now?

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation.

BETHLEHEM STEEL

BETHLEHEM STEEL

coal recovery and beneficiation where the economics favor.

Conformity with antipollution regulations, in addition to a desire to increase recovery, resulting in major growth in the installation of facilities for clarifying water.

Desliming with various types of equipment being increasingly practiced to improve the efficiency of fine-coal washing and especially dewatering in filters or other mechanical equipment.

Ultrafine screening being developed to assist in sizing and dewatering of the fines and ultrafines.

Maintenance

"Preventive maintenace" is being emphasized as a result of increased use of more-complicated and costlier equipment, and to obtain lower production cost.

Maintenance budgets being increased accordingly and will aggregate an even-larger share of coal cost.

Contract repairing and overhauling, particularly the latter, being increasingly practiced by mining companies.

Training to develop maintenance men and to enhance their skills being increasingly practiced.

Supplies

Increased cost of parts and materials being reflected in strong emphasis on close inventory control.

Going beyond the standard "supply-distribution reports" and requiring more detailed information of the use of parts and materials by machine and by working section growing as a means of more effectively controlling cost and increasing efficiency.

Trend to central supply houses to serve multimine operations gathering momentum for economy reasons. Advantages include reduction in total inventory and opportunities for buying supplies in larger quantities at reduced prices.

Safety

Continued emphasis on the prevention of roof-fall accidents—still the No. 1 killer in coal mines, with haulage accidents second.

Development of approved mine-lighting systems to improve safety performance by raising underground illuminations to levels approaching those in other industries.

Development of new dust-suppression methods, including foam barriers between machine and face, and of dust-collecting systems, including units for mounting on the machines themselves, expected to be increasingly effective in alleviating this hazard.

Return to auxiliary fans and blowers for improved face ventilation in continuous-miner sections under carefully controlled conditions becoming an increasing possibility. Continuous monitoring of methane content, possibility with interlocking to shut off power, also receiving increased study.

Training

Increasing emphasis being placed on training miners to equip them for eventually becoming foremen.

Skills of existing supervisors being increased by courses in being a better boss.

Growing need for skilled mechanics and electricians being met by more on-the-job training.

Training of machine operators in skills needed in their jobs, and in trouble-shooting and maintenance, receiving increased attention.

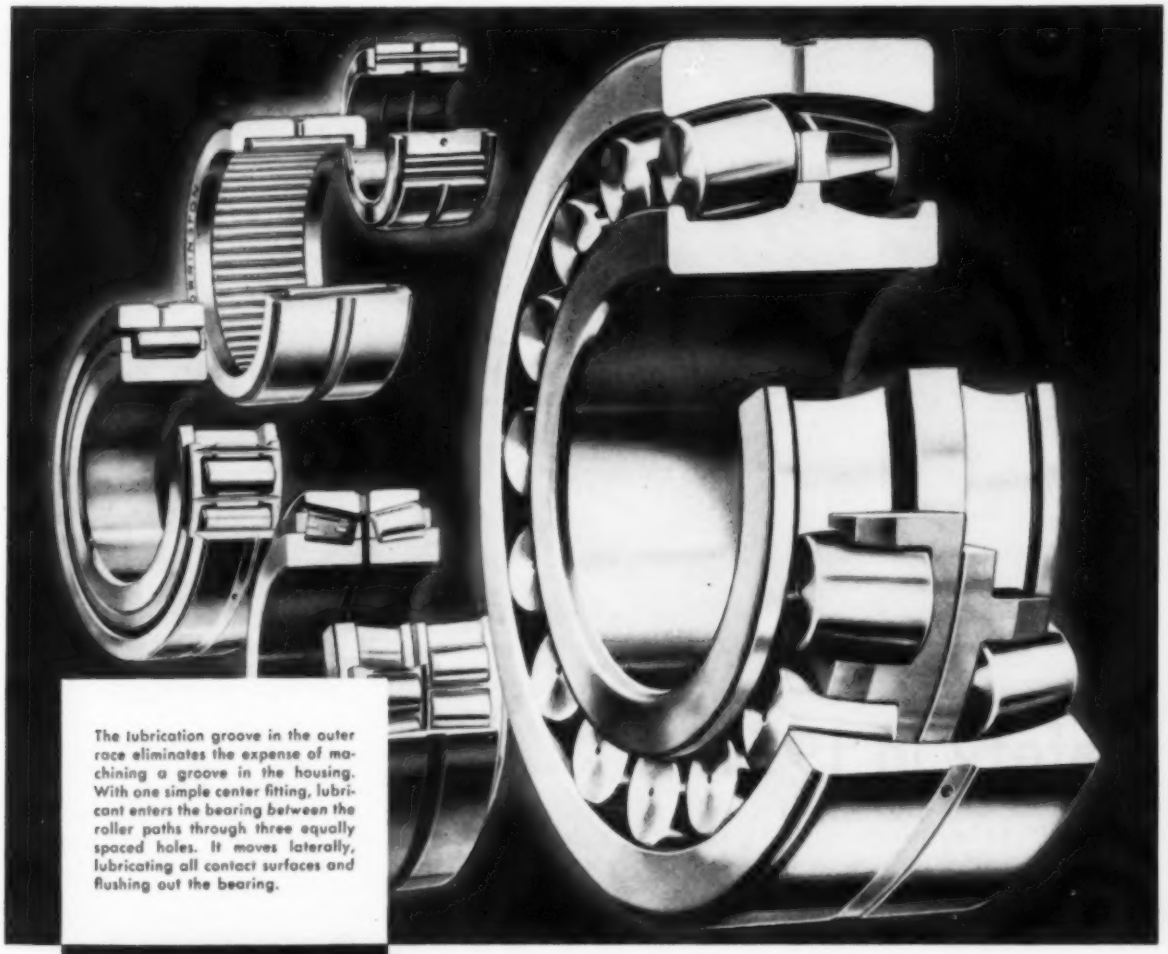
Steps being taken in certain areas to interest high-school students in mining not only to get engineers but also create a pool of talent from which to draw miners and supervisors.

Future Possibilities

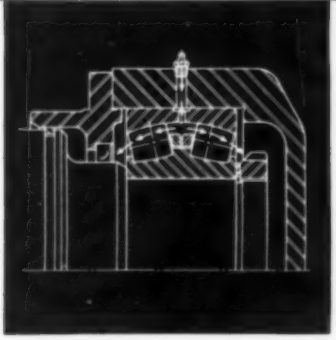
School mines or sections for training machine operators and other employees for an area or a group of mines.

Your Mining Guidebook

Brought up to date and rounded out with new developments, the material in this feature is a development of an idea first incorporated in the 1957 *Coal Age* Mining Guidebook and Buying Directory, published in Mid-July, 1957. Check it for a fuller discussion of these trends, of other mining developments, for the basic principles on which good mining necessarily is based, and for buying help. And look for the next edition, in Mid-July, 1958, for the latest roundup of new ideas for low cost, quality and safety.



The lubrication groove in the outer race eliminates the expense of machining a groove in the housing. With one simple center fitting, lubricant enters the bearing *between* the roller paths through three equally spaced holes. It moves laterally, lubricating all contact surfaces and flushing out the bearing.



A time-proved lubricating method now available on Torrington Spherical Roller Bearings

The circumferential groove in the outer race has met the test of experience in many Torrington Bearings, including Heavy Duty Needle Bearings, Aircraft Type Needle Bearings, Tapered and Radial Roller Bearings. Now the circumferential lubrication groove is available in Torrington Spherical Roller Bearings.

This design feature makes it possible to introduce lubricant *between* the roller paths without the expense of machining a groove in the housing. This groove is proportioned to provide generous lubricant flow capacity. Lubricant moves through the roller paths, flushing used lubricant and contaminants away from bearing contact surfaces.

Torrington Spherical Roller Bearings in many sizes may be ordered with this groove as desired at no additional cost. For further information, see your Torrington representative or write: **The Torrington Company, South Bend 21, Ind.—and Torrington, Conn.**

TORRINGTON BEARINGS

District Offices and Distributors in Principal Cities of United States and Canada

SPHERICAL ROLLER • TAPERED ROLLER • CYLINDRICAL ROLLER • NEEDLE • BALL • NEEDLE ROLLERS • THRUST

RESEARCH FOR SAFETY keynoted industry activities in 1957. Roof control with adhesive compounds (above), better face ventilation through the use of auxiliary fans and control of bumps received close study in coal-mine "laboratories".

Safety in 1957

WE KNOW we have not reached the irreducible minimum in numbers of mine accidents, and we know the industry's safety effort is not stuck on dead center. However, we have come through a year in which any improvement in the safety record is hard to find. Preliminary figures from the Bureau of Mines, shown in the accompanying table, tell that the total number of fatalities and the rates of occurrence of fatalities showed a sharp increase in 1957. Assuming that the irreducible minimum has not been achieved and that coal's safety effort is not stuck on dead center, we then see a need for a major breakthrough either in safety technology or in the development of personal attitudes on safety among miners and supervisors that will be reflected in improved rates next year.

On the dark side of the 1957 ledger is a list of five major disasters, or accidents in which five or more men lost their lives. In January, five men were killed by an explosion in an Alaskan mine; in February, 37 men lost their lives in an explosion at the Virginia-West Virginia border; in September six men were killed in an explosion in Pennsylvania, and in December, five men were killed by a roof-fall in West Virginia and 11 were killed in another explosion at the Virginia-West Virginia border.

On the brighter side, reports for the month of October showed that fatality rates were down to 0.44 per million tons and 0.57 per million man-hours of exposure for bituminous and anthracite combined, the lowest monthly rates in USBM annals. More than 1,300 mines had enrolled in the national campaign to reduce the numbers of roof-fall accidents by 50%. A number of mines had embarked on retraining programs in accident prevention.

Granted the news on fatalities in 1957 is discouraging, the news on occurrence of all injuries shows solid improvement during the first three quarters of the year. For example, in the first 9 mo of 1956, fatal and nonfatal injuries in anthracite and bituminous occurred at a rate of 48.43 per million man-hours of exposure, while in 1957 the comparable rate in the same period was 45.41. This represents a dividend of 6% on the safety effort put forth by all parties in the industry, and though it may not be big enough, it is in the right direction.

Some progress was made in haulage safety in 1957. Reports for the first 11 mo of the year listed 55 fatalities resulting from haulage accidents, against 67 deaths from similar causes in the same period of 1956. This improvement no doubt reflects the increased emphasis now being placed on safer shuttle-car operation. Most companies absolutely forbid operation of a car unless the operator faces the direction of travel.

Roof safety, though, was the recurrent theme in 1957. The Bureau of Mines, in its monthly accident analyses began to report roof-fall fatalities in several categories, rather than under a single heading. For example, the breakdown now includes a resume of fatalities caused by roof falls when moving equipment knocks out supports, when face, side ribs or pillars fall and when bumps or bursts occur. Fatalities resulting from falls of overhead roof are reported separately. This pinpointing of causes should lead to a better understanding of the various hazards, giving management, supervisors and mineworkers an opportunity to design safeguards.

The causes of mountain bumps are being diligently sought with the aim of devising corrective measures, including mining plans that will inhibit these cataclysmic strata breaks and drilling strategic pillars to relieve

U. S. Coal-Mine Fatalities in 1957 and 1956[1]

Cause and Location	Bituminous				Anthracite				Total			
	Fatalities		Rate[2]		Fatalities		Rate[2]		Fatalities		Rate[2]	
	1957	1956	1957	1956	1957	1956	1957	1956	1957	1956	1957	1956
Falls of roof	193	198	0.39	0.40	27	29	1.06	1.00	220	227	0.43	0.43
Falls of roof from equipment knocking out support	4	2	.01	....[3]	...	...	....	....	4	2	.01	....[3]
Falls of face, side rib, or pillar	2	9	....[3]	.02	3	2	.12	.07	5	11	.01	.02
Falls of roof or face, etc. from bumps, bursts	14	5	.03	.01	...	...	....	....	14	5	.03	.01
Inrush of water or material	...	...	....	....	...	...	....	....	...	...	....	....
Haulage	53	71	11	14	4	6	16	21	57	77	11	15
Explosions: Minor	4	5	.01	.01	3	4	12	14	7	9	.01	.02
Major	59	...	12	....	...	...	....	....	59	...	11	....
Explosives	7	7	.01	.01	4	1	16	.03	11	8	.02	.02
Electricity	11	13	.02	.03	1	2	.04	.07	12	15	.02	.03
Machinery	17	17	.03	.03	...	...	....	....	17	17	.03	.03
Mine fires	1	2	....[3]	....[3]	...	...	....	....	1	2	....[3]	....[3]
All other	8	11	.02	.02	6	4	.24	.14	14	15	.03	.03
Total underground	373	340	.76	.68	48	48	1.88	1.66	421	388	.82	.73
Surface: Haulage	8	11	.02	.02	...	2	....	.07	8	13	.02	.02
Electricity	3	4	.01	.01	1	...	.04	....	4	4	.01	.01
Machinery	7	5	.01	.01	...	1	....	.03	7	6	.01	.01
All other	9	4	.02	.01	1	2	.04	.07	10	6	.02	.01
Total surface	27	24	.06	.05	2	5	.08	.17	29	29	.06	.05
Strip mines: Haulage	7	9	.01	.02	...	1	....	.03	7	10	.01	.02
Electricity	2	2	....[3]	....[3]	...	...	....	....	2	2	....[3]	....[3]
Machinery	4	2	.01	....[3]	...	1	....	.03	4	3	.01	.01
All other	7	12	.01	.02	...	1	....	.03	7	13	.01	.02
Total strip	20	25	.04	.05	...	3	....	.10	20	28	.04	.05
Auger mines: Falls of roof or face	1	...	....[3]	....	...	...	....	....	1	...	....[3]	....
Haulage	...	...	....	....	...	...	....	....	...	...	....	....
Explosions: Minor	1	...	....[3]	....	...	...	....	....	1	...	....[3]	....
Major	...	...	....	....	...	...	....	....	...	...	....	....
Machinery	1	...	....[3]	....	...	...	....	....	1	...	....[3]	....
Suffocation	...	...	....	....	...	...	....	....	...	...	....	....
All other	...	...	....	....	...	...	....	....	...	...	....	....
Total auger	3	...	.01	....	...	...	....	....	3	...	.01	....
Grand total	423	389	.86	.78	50	56	1.96	1.94	473	445	.92	.84

[1]All figures are subject to revision. [2]Fatalities per million short tons. [3]Less than 0.005.

stresses. In other studies, the possibility of binding roof layers together to increase beam strength was in the testing stage. The aim of this research is to develop materials, equipment and methods for pumping adhesives into the roof in advance of the face.

A greater interest in the science of rock mechanics was evident. The outcome of investigation and analysis in this field may be a fuller understanding of the forces acting in massive overburden when underlying strata are disturbed by mining.

In other phases of operations—ventilation, for example—the industry is taking forward steps to develop methods that will prevent hazardous conditions from arising. Many of the newer mines provide separate splits of air for each mechanical section. There is increasing interest in the possibility of using carefully-controlled auxiliary fans in continuous-mining places to move adequate volumes of fresh air across the immediate face. Studies show that line curtains have not measured up to the job in many instances. And a further complication is the bulk of the machine itself, obstructing the passage of air to the face. Various combinations of auxiliary fans are being tried in a search for better ways to ventilate at the face without slowing down the mining equipment.

Also in 1957, the industry heard reports on the relationship of weather to mine explosions which may open up new avenues of approach to preventing such accidents.

New emphasis on effective underground fire-control systems was noted in many areas. The safeguards included new portable fire trucks and chemical extinguishers, caches of fire-fighting equipment throughout the workings, planned ventilation to insure clear escapeways and effective organization and communications.

Louisville, Ky., was the scene of the biennial National First Aid and Mine Rescue Contest in October. Winners in first aid were the men representing Wyoming mine, Island Creek Coal Co., Holden, W. Va., over 46 other first aid teams. In the mine rescue contest, the team from U. S. Steel Corp.'s Lynch District, Lynch, Ky., won over seven other teams.

In the 32nd National Safety Contest for the "Sentinels of Safety" awards from *Explosives Engineer* Magazine, the winning mine in the bituminous competition was Edgewater mine, Tennessee Coal & Iron Div., U. S. Steel Corp., Wylam, Ala., and in anthracite the winner was Goodspring mine, Penag Coal Co., Goodspring, Pa. Edgewater worked 766,644 man-hours without a disabling injury. Goodspring worked 106,162 man-hours with 14 injuries.

Ohio Brass

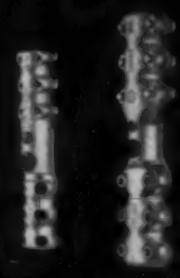
FIRST IN MINE HAULAGE

locomotive equipment, rail bonds, line materials, automatic couplers, safety, and control equipment.

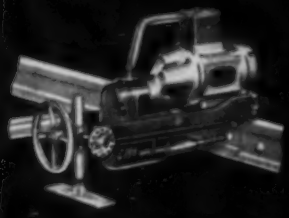
If your problem concerns accessory equipment for mine haulage, you'll find a solution at Ohio Brass -- perhaps even among the O-B products and publications shown on these pages.

For over half a century, mine operators in this country and throughout the western hemisphere have come *first* to O-B with their coupler, collector, bond, line material, switch, and electrical equipment problems -- for every haulage need, in fact, from simple hangers to the most comprehensive blueprints for complete haulage systems.

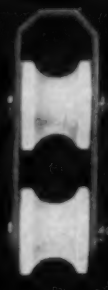
To get our monthly "how-to-do-it" bulletins, or more information on any product, fill out and mail the coupon below.



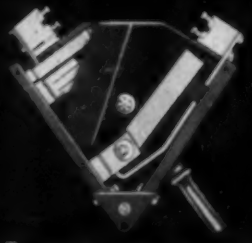
1. Cable Connectors



5. Rail Drills for Wedge Bonding



10. Porcelain Insulators



15. Feeder Safety Switches (Cover Removed)

19. Rail Clamps

OHIO BRASS COMPANY, MANSFIELD, OHIO

4805-M

Name .....

Company .....

Position .....

Address .....

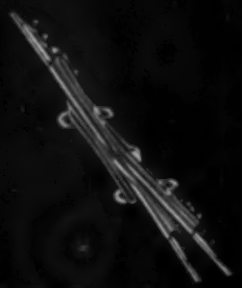
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

16 17 18 19 20 21 22 Other.....

☐ *A Storehouse of Ideas*—O-B Mining and Industrial Catalog No. 27 is loaded with suggestions for more efficient haulage. Check the box to get your copy.

☐ *A Library of Information*—O-B Haulage Ways brings 8,000 mining men "how-to-do-it" articles and new product information every month. Just check the box to add your name to the list.

☐ *Aluminum Feeder Cable*—Supplement No. 1 to the O-B No. 27 Catalog lists O-B fittings for aluminum cable and describes correct installation procedures. Check box for your copy.



2. Trolley Frogs, Crossovers

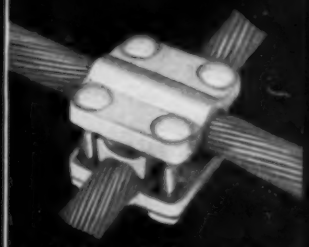
3. Expansion Bolts

4. Automatic Couplers

6. Trolley Wire Clamps

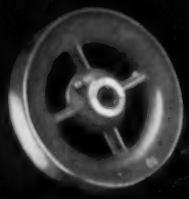
7. Hanger Adapters

8. Insulated Hangers



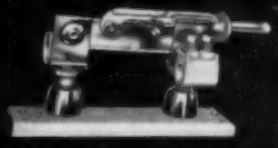
9. Branch Connectors

11. Trolley Wire Conditioning Equipment



12. Wheel Collectors

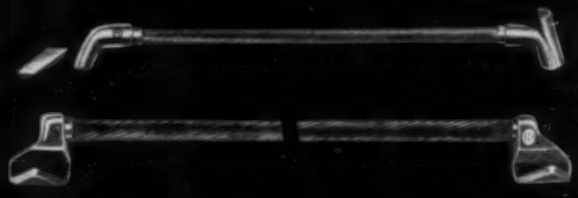
13. Feeder and Trolley Splicers



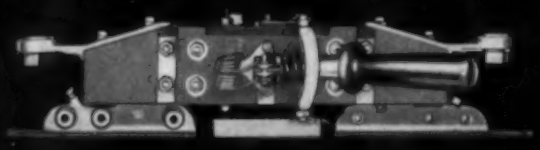
14. Quick Break Switches

16. Shoe Collectors

17. Fused Taps



18. Rail Bonds



20. Section Insulator Switches

21. Combination Feeder Trolley Clamps

22. Bond Welding Equipment

1957 Sales of Mining Equipment

By **W. H. Young**, Chief, Bituminous Coal and Lignite Section, and **R. L. Anderson**, Supervisory Commodity-Industry Analyst, U. S. Bureau of Mines.

SHIPMENTS of mechanical-loading equipment for underground use in coal mines in the United States, in terms of capacity, registered practically no change in 1957 from 1956. The capacity of mechanical cleaning equipment sold for use at bituminous mines was 12% greater in 1957 than in 1956. Shipments of mobile loading machines, coal-recovery augers, shuttle cars, room or transfer conveyors, and bridge conveyors decreased while continuous mining machines and "mother" conveyors increased in 1957 from 1956.

This survey was made possible by the cooperation of all known manufacturers of mechanical cleaning equipment for bituminous mines and of mechanical loading and supplementary haulage equipment and coal-recovery augers for use in all coal mines in the United States. Data from various trade journals were also utilized.

Mechanical loading units, coal-recovery augers and supplementary haulage equipment sales in 1957, as in previous years, represent shipments made during the year. Of the total capacity of mechanical cleaning equipment sold in 1957, 31% was placed in operation during that year; the remainder to be installed later.

Mechanical Loading and Mining

Bituminous coal and lignite mechanically loaded in underground mines decreased from 307 million tons in 1956 to an estimated 305 million tons in 1957. Production at strip mines decreased from 127 million tons to an estimated 122 million tons, and auger production increased from 8 to 10 million tons during the same period.

Table I shows bituminous and lignite production by methods of mining and mechanical cleaning for 1955-57, inclusive. The percentage of total output mechanically loaded and cleaned increased in 1957 over 1956. During 1957, 89% of the total output was mechanically loaded at underground mines, loaded by power shovels at strip mines, or mined by augers along highwalls in strip mines.

Table I—United States Bituminous and Lignite Production, by Methods of Mining and Cleaning

	1955		1956		1957*	
	Thousands of Net Tons	Percent of Total	Thousands of Net Tons	Percent of Total	Thousands of Net Tons	Percent of Total
Hand-loaded underground	52,794	11.4	58,372	11.6	53,000	10.8
Mechanically loaded underground	290,671	62.5	307,402	61.4	305,000	62.3
Mined at auger mines	6,075	1.3	8,045	1.6	10,000	2.0
Mined by stripping	115,093	24.8	127,055	25.4	122,000	24.9
Total production	464,633	100.0	500,874	100.0	490,000	100.0
Mechanically cleaned	272,715	58.7	292,365	58.4	290,000	59.2

*Preliminary.

Table II—Underground Bituminous and Lignite Production by Methods of Loading

	1955		1956		1957[1]	
	Thousands of Net Tons	Percent of Total	Thousands of Net Tons	Percent of Total	Thousands of Net Tons	Percent of Total
Mobile loading machines:						
Loading direct into mine cars	47,397	13.8	35,428	9.7	...[2]	...[2]
Loading onto conveyors	12,505	3.6	14,0[illegible]	3.8	...[2]	...[2]
Loading into shuttle cars	183,303	53.4	198,844	54.3	...[2]	...[2]
Continuous mining machines	27,460	8.0	39,907	10.9	...[2]	...[2]
Scrapers	140	....	156	....	...[2]	...[2]
Conveyors equipped with duckbills or other self-loading heads	4,369	1.3	3,727	1.0	...[2]	...[2]
Hand-loaded conveyors	15,497	4.5	15,271	4.3	...[2]	...[2]
Total mechanically loaded	290,671	84.6	307,402	84.0	305,000	85.2
Hand-loaded into mine cars	52,794	15.4	58,372	16.0	53,000	14.8
Total underground production	343,465	100.0	365,774	100.0	358,000	100.0

[1] Preliminary. [2] Included with "Total mechanically loaded."

Table III—Mechanical Loading and Mining Equipment Sold For Use in Coal Mines as Reported by Manufacturers

	1953	1954	1955	1956	1957	Change from 1956 (Percent)
Bituminous-coal and lignite mines:						
Mobile loading machines	180	92	120	239[1]	209	− 12.6
Continuous mining machines	67	101	109	154	168	+ 9.1
Coal-recovery augers	57	55	65	89	53	− 40.4
Scrapers[2]	11	5	...	...	...	....
Shuttle cars	437	242	348	560[1]	488	− 12.9
"Mother" conveyors[3]	58	19	78	137	172	+ 25.5
Room or transfer conveyors[4]	87	61	143	232	159	− 31.5
Bridge conveyors	...[5]	...[5]	...[5]	128	96	− 25.0
Anthracite mines (Pennsylvania):						
Mobile loading machines	1	17	1	...[1]	1	....
Continuous mining machines	...	1	...	...	1	....
Coal-recovery augers	...	...	1	...	2	....
Scrapers[2]	3	...	2	...	...	....
Shuttle cars	...	14	8	2	2	....
"Mother" conveyors[3]	...	...	3	...	2	....
Room or transfer conveyors[4]	16	24	7	19	45	+136.8
Bridge conveyors	...[5]	...[5]	...[5]	...	1	....
Number of manufacturers reporting	25	23	22	22	21	....

[1] Revised.
[2] Reported as scrapers or scraper haulers and hoists.
[3] Includes all haulage conveyors with a capacity over 500 ft, except main slope conveyors.
[4] Includes all haulage conveyors with a capacity of 100 ft, to 500 ft, except main slope conveyors.
[5] Not available.

Underground production of bituminous and lignite, by methods of loading, is listed in Table II. Although the percentage of under-

Table IV—Sales of Mechanical Loading Equipment in 1957 Compared With Machines in Use in Preceding Years

	Number Machines Operators reported in Use					Sales
	1952	1953	1954	1955	1956	1957
Bituminous and lignite:						
Mobile loading machines	4,083	3,985	4,314	3,819	3,854	209
Continuous mining machines	152	219	325	385	510	168
Scrapers	19	29	48	23	35	...
Conveyors equipped with duckbills or other self-loading heads	1,049	849	633	487	437	...[1]
Hand-loaded room conveyors, number of units	3,569	2,994	2,162	1,925	1,819	159
Anthracite Mines (Pennsylvania):						
Mobile loading machines	54	39	68	79	80	1
Continuous mining machines	.....	.....	.....	.....	.....	1
Scrapers[2]	456	489	359	279	303	...
Hand-loaded room conveyors, number of units[2]	3,232	2,784	2,277	1,940	1,593	45

[1] Sales of conveyors equipped with duckbills or other self-loading heads are included with hand-loaded room conveyors.

[2] Includes pit-car loaders and conveyors equipped with duckbills or other self-loading heads.

Table V—Mechanical Loading and Mining Equipment in Use in 1956, 1957 Sales

State	Mobile Loading Machines		Continuous Mining Machines		Scrapers		Room Conveyors[1]		Coal-Recovery Augers	
	In use in 1956	Sales in[1] 1957	In use in 1956	Sales in 1957	In use in 1956	Sales in 1957	In use in 1956	Sales in 1957	In use in 1956	Sales in 1957
Bituminous and lignite:										
Alabama	115	7	10	7	...	...	84	...	1	...
Alaska	6	...	2	...	13	...	11	1	...	...
Arkansas	...	...	1	...	...	...	25	1	...	...
Colorado	47	...	5	2	6	...	157	...	...	...
Illinois	200	1	35	3	...	...	8	...	...	...
Indiana	70	3	3	2	...	...	...	...	...	...
Iowa	4	...	...	...	...	...	...	...	...	...
Kentucky	532	17	16	12	...	...	179	20	44	16
Maryland	...	...	...	...	...	...	15	...	...	...
Missouri	...	...	...	...	...	...	...	...	...	1
Montana, bituminous	16	...	...	...	...	...	7	...	..	...
New Mexico	2	1	...	...	...	...	1	...	...	...
North Dakota and Montana, lignite	3	...	...	...	...	...	...	...	...	...
Ohio	141	...	23	8	...	...	37	...	47	7
Oklahoma	5	...	...	1	...	...	80	...	...	...
Pennsylvania	843	30	248	59	3	...	552	28	33	7
Tennessee	44	7	1	...	...	...	41	2	13	1
Utah	131	14	12	6	...	...	14	...	...	...
Virginia	187	14	11	11	...	...	33	5	26	5
Washington	4	...	6	...	7	...	32	...	...	...
West Virginia	1,471	115	135	57	...	...	867	102	124	16
Wyoming	33	...	2	...	6	...	113	...	...	...
Total	3,854	209	510	168	35	...	2,256	159	288	53
Anthracite mines (Pennsylvania)	80	1	...	1	303	..[2]	1,593	45	...[3]	2
Grand total	3,934	210	510	169	338	...	3,849	204	288	55

[1] Includes hand-loaded conveyors and conveyors equipped with duckbills or other self-loading heads.

[2] Also includes pit-car loaders.

[3] Data not available.

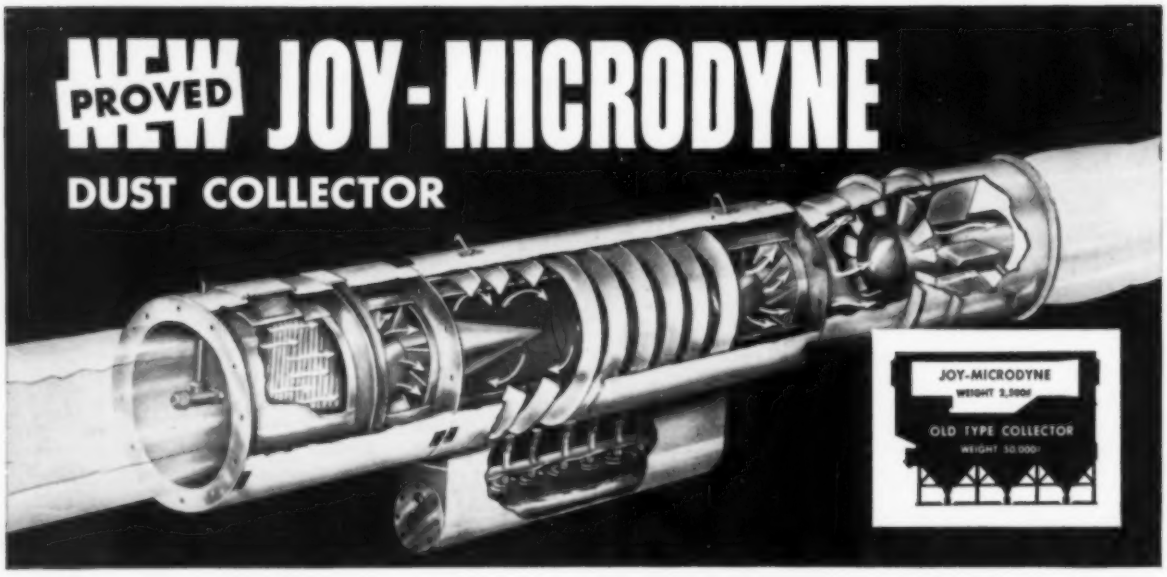
ground production mechanically loaded registered a slight decline in 1956 from 1955, it is estimated that in 1957 it will be higher than ever.

Auger Mining—Augers are used for coal recovery along highwalls in strip mines and on bench operations where coal cannot be economically mined by stripping. Separate data on the number of augers in use and the tonnage produced by auger mining were first collected for 1952.

Reports from four auger manufacturers show that 55 augers were shipped in 1957 compared with 89 in 1956, a decrease of 38%. All augers shipped in 1957 were for surface use except two that were shipped to anthracite mines for underground use. Table III shows coal-recovery auger shipments in 1953-57, and Table V, the number in use in 1956 and shipments in 1957.

Types of Units Sold—Table III lists the units of mechanical loading and mining equipment shipped for use at coal mines in the United States during 1953-57, inclusive. Shipments of continuous mining machines and "mother" conveyors increased in 1957; all other types of mechanical loading and mining equipment listed on Table III de-

NEW PROVED JOY-MICRODYNE DUST COLLECTOR



Profile of a Problem Solver

Here is an in-duct "educated pipe" that laughs at space, weight and water limitations as it collects over 99% of dust 5 microns and larger; 92% of 2-micron dust, and substantial amounts of smaller dust.

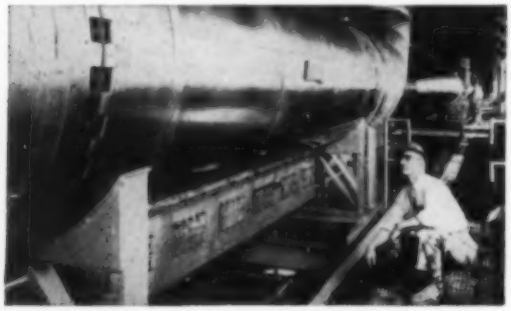
Particles enter through water-saturated air, slam against a water-film-covered impingement element, encase themselves in water droplets as they pass through, then whirl and collect on the sides of the middle section, to finally drain into a sump. Cleaned air is straightened and thrust on its way by an integral Joy Axivane Fan.

SAVES SPACE—Installs as an integral section of duct-work; requires only 1/10 to 1/20 the space of conventional units. 2500 cfm unit is 10 feet long; 1.5 feet in diameter.

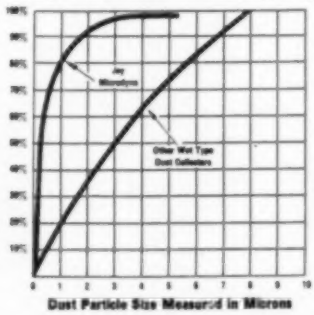
SAVES WEIGHT—Even the largest unit—64,000 cfm, 5 feet in diameter, 32 feet long—weighs only 6,500 pounds . . . or 1/5 the weight of conventional collectors. 2,500 cfm unit weighs only 325 pounds.

SAVES WATER—The largest Joy collector requires only 48 GPM flow—much less than comparable wet collectors. Add a Delpark Filter (Sold by Joy) and water can be recirculated to recover valuable dusts. The filter also reduces water borne solids to give a dependable, clear water supply from a dirty water source.

SUCCESSFUL INSTALLATIONS—Joy collectors from 500 cfm through 64,000 cfm are *now in use* collecting such widely varied dusts as hemitite, copper and uranium ores, coal, quartz, limestone, phosphate, stainless steel and titanium carbide grindings. For answer to your dust collecting problems, write, wire or call: ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** *In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*



This 48,000 cfm installation shows compact assembly and space economy of in-duct placement.



Performance graph of actual installation shows efficiency of the Joy-Microdyne Dust Collector. (A micron is 1/25,000 inch)

WRITE FOR FREE BULLETIN 231-1

See data on other Joy products in this issue

WSW 1 7002-231

JOY . . . EQUIPMENT FOR INDUSTRIAL PLANTS . . . FOR ALL INDUSTRY

Conveyors

Industrial Compressors

Electrical Connectors

Fans and Blowers

Table VI—Units of Conveying Equipment Sold for Use in Coal Mines, 1956-57

	Bridge conveyors		Shuttle cars		"Mother" conveyors[1]	
	1956	1957	1956[2]	1957	1956	1957
Bituminous and lignite:						
Alabama	6	7	33	49	7	2
Colorado	..	..	4	5	1	2
Illinois	4	..	9	4	12	6
Indiana	..	..	8	3	1	1
Kentucky	30	16	35	30	6	15
New Mexico	..	..	..	2	..	..
Ohio	10	..	10	..	9	16
Oklahoma	..	1	2	..	..	2
Pennsylvania	12	14	130	99	36	40
Tennessee	..	..	4	2	1	1
Utah	..	..	8	30	4	5
Virginia	3	7	40	21	7	9
West Virginia	63	51	275	241	53	73
Wyoming	..	..	2	2	..	..
Total	128	96	560	488	137	172
Anthracite mines:						
Pennsylvania	..	1	2	2	..	2
Grand total	128	97	562	490	137	174

[1] Includes all gathering and haulage conveyors with capacity over 500 ft, except main slope conveyors.
[2] Revised.

Table VII—Bituminous Coal Mechanically Cleaned in 1956 Compared With 1957 Sales of Equipment

State	1956			Annual capacity of equipment sold in 1957 (net tons)[1]
	Number of Plants in Operation	Net Tons of Cleaned Coal	Output Mechanically Cleaned (Percent)	
Alabama	32	11,306,990	89.3	...[2]
Alaska	4	341,486	47.0	...
Arkansas	...[3]	...[3]	...[3]	...
Colorado	4[3]	1,312,764[3]	37.5[3]	30,000
Illinois	61	41,396,985	86.1	412,000
Indiana	23	12,310,515	72.0	2,022,000
Kansas	3	611,136	69.1	...
Kentucky	84	41,708,504	55.9	2,129,000
Missouri	11	3,072,313	93.6	...
Montana	2	12,315	1.5	...
New Mexico	1	32,775	20.7	120,000
Ohio	26	17,059,794	43.8	...[2]
Oklahoma	3	553,333	27.6	...
Pennsylvania	100	54,845,125	60.7	1,415,000
Tennessee	4	1,001,992	11.3	...
Utah	4	3,333,135	51.1	...[2]
Virginia	27	12,132,408	43.2	3,736,000
Washington	5	457,956	96.9	...
West Virginia	188	90,862,855	58.3	9,219,000
Wyoming	1	13,003	.5	120,000
Undistributed	...	...	...	608,000
Total	583	292,365,384	58.4	19,811,000

[1] Based on average days mines were active in 1956 and 7.0 hr per day.
[2] Included in "Undistributed."
[3] Arkansas included with Colorado.

creased, except scrapers, which had no shipments in either year.

Exports of underground mechanical-loading equipment in 1957, in terms of capacity, amounted to 15% of the shipments to mines in the United States compared with 14% in 1956.

Types of Mechanical-Loading Equipment Sold Compared With Units In Use—Table IV shows the trend in demand for various types of mechanical-loading equipment. Continuous mining machines were first used in 1948. However, the number in use was not shown separately until 1952. The number in use has increased every year from 1952 to 1956. Shipments of continuous mining machines in 1957 were 33% of the number in use in 1956 at both bituminous, lignite and Pennsylvania anthracite mines. Mobile loading machine shipments in 1957 were 5% of the number in use in 1956.

Table V shows the number of mechanical loading units and coal-recovery augers shipped to various states in 1957 compared with the number in use in 1956, as reported by mine operators. Sales of room conveyors as listed in Table V are not exactly comparable with the number in use. To avoid duplication in tonnage mechanically loaded, each mine operator was instructed to report "hand-loaded" and "self-loading" conveyor tonnage only. Therefore, room conveyors loaded by mobile loading machines and continuous mining machines are not included with "Room conveyors in use in 1956." Shipments of coal-recovery augers in 1957 were 19% of the total number in use in 1956.

Haulage Equipment

Shuttle Cars—Sales of shuttle cars decreased from 562 in 1956 to 490 in 1957. Details of shipments to various states in 1956 and 1957 are given in Table VI.

Exports of shuttle cars in 1957 increased approximately 75% over the previous year. Units exported in 1957 amounted to approximately 28% of the 1957 U. S. sales.

"Mother" Conveyors—For the purpose of this study "mother" conveyors includes sectional, extensible, power-driven gathering and haulage units that can handle over 500 ft of conveyor. Main-slope conveyors are excluded. Table III lists sales for 1953-57, inclusive, and Table VI shows shipments by states in 1956 and 1957. Exports of "mother" conveyors in 1957 were approximately 1% of the sales in the United States.

Bridge Conveyors—Sales of bridge conveyors decreased from 128 in 1956 to 97 in 1957 or 24%. Shipments by states are listed on Table VI.

Mechanical Cleaning

Reports from 21 manufacturers of bituminous-coal-cleaning equipment show that the total capacity of 1957 sales was 13,225 net tons of clean coal per hour compared with 11,810 tons of capacity sold in 1956, an increase of 12%. Sales in 1957, by type of equipment, in terms of capacity, show that dense medium ranked first, followed by jigs and wet tables. The capacity of all types of equipment sold in 1957 for cleaning bituminous coal by wet methods was equivalent to 7% of the bituminous coal cleaned by wet methods in 1956, and the capacity of pneumatic equipment sold in 1957 was 67% of the tonnage pneumatically cleaned in 1956. Approximately 64% of the total capacity of cleaning equipment sold in 1957 was for additions to present installations and the remainder, 36%, comprised new plants.

Table VII gives data on bituminous coal cleaned in 1956 and the annual capacity of equipment sold in 1957 by states.

Allison TORQMATIC Transmission—patterned after the automatic drive that made its fame in giant earthmovers—is now available in a complete line of GMC trucks—with V8 or six-cylinder power—single or tandem axles—conventional or dual-purpose models

Nothing like a GMC Money-Maker with Allison TORQMATIC "Drive"!

"Drive" is right! Load your GMC right up to top capacity—make your own "roads" through muck and mire—or point it up the toughest grades—and you'll discover what *real* haul-ability is. Allison Transmissions have been putting that kind of "go" in giant earthmovers for more than 10 years now.

You'll save trip-time, too. For there's a 14.8 to 1 reduction for positive, easy starts—every time. And with four driving ranges that give you six forward speeds – you get just the amount of truck-propelling torque you need, when you need it – *automatically.*

Your brake maintenance is cut. Thank a built-in Hydraulic Retarder that gives you positive "engine braking" at the touch of a pedal. That's a real safety factor as well – especially with a hefty load behind you.

Your engine and drive-line are constantly protected from damaging shock. That's assured by the torque convertor – working with a direct-drive lockup that engages in every gear for real fuel economy. And there are *two* power take-off openings.

All these Allison TORQMATIC benefits are now available in GMC Money-Makers blanketing the entire 19,500-46,000 GVW range. Get the rest of the facts and figures at your GMC dealer's!

GMC TRUCK & COACH – *A General Motors Division*

GMC–America's Ablest Trucks

GMC Money-Makers available in models from ½ to 45 tons

Thermocoal Belting

EVERYTHING THE U.S.B.M. REQUIRES*

...and more!

When you order conveyor belting for underground coal mine use, be sure it's new, fire-resistant Thermocoal—the belt that bears acceptance designation #28-13 of the U.S. Bureau of Mines.

You'll not only have a belt that meets or exceeds all after-flame and after-glow tests . . . you'll also benefit from typical Thermoid toughness. Thermocoal Belts are engineered for high resistance to flexing and impact, edge wear, abrasion and mildew. You can specify either 4 or 6 ply construction of the strongest cotton or cotton-nylon duck—impregnated with specially compounded Thermoid rubber stocks to assure longer life, lower costs.

*U.S.B.M. acceptance designation #28-13.

Order Thermocoal Belting through your Thermoid Distributor, or write direct for detailed information and data sheets.

Make Thermoid your choice, too, for Multi-V Belts...

... and Hose manufactured with your needs in mind.

Thermoid

Thermoid Company
Trenton, New Jersey
Nephi, Utah

If You Use Blasting Caps

EXAMINE THESE FEATURES

1. **DEPENDABLE FIRE**—Special alloy is used as the bridge wire in the firing element of Hercules Electric Blasting Caps. Wire is noncorrosive.

2. **ENGINEERED SHELL**—Bronze shell of a Hercules cap goes through fifteen separate operations while it is being expertly shaped.

3. **TOUGH, HIGH DIELECTRIC INSULATION**—Leg wires of Hercules caps are coated with plastic insulation for outstanding toughness, resistance to abrasion, superior dielectric qualities.

4. **SECURELY ANCHORED**—A cast sulfur plug in the upper part of shell anchors entire firing mechanism in place.

5. **WATERTIGHT WATERPROOFING**—A special Hercules waterproofing formulation minimizes the possibility of moisture or dampness penetration.

6. 7. **DOUBLE-PACKED WALLOP**—Bridge wire extends into the priming charge and makes positive contact to give rapid ignition.

HERCULES BLASTING CAPS

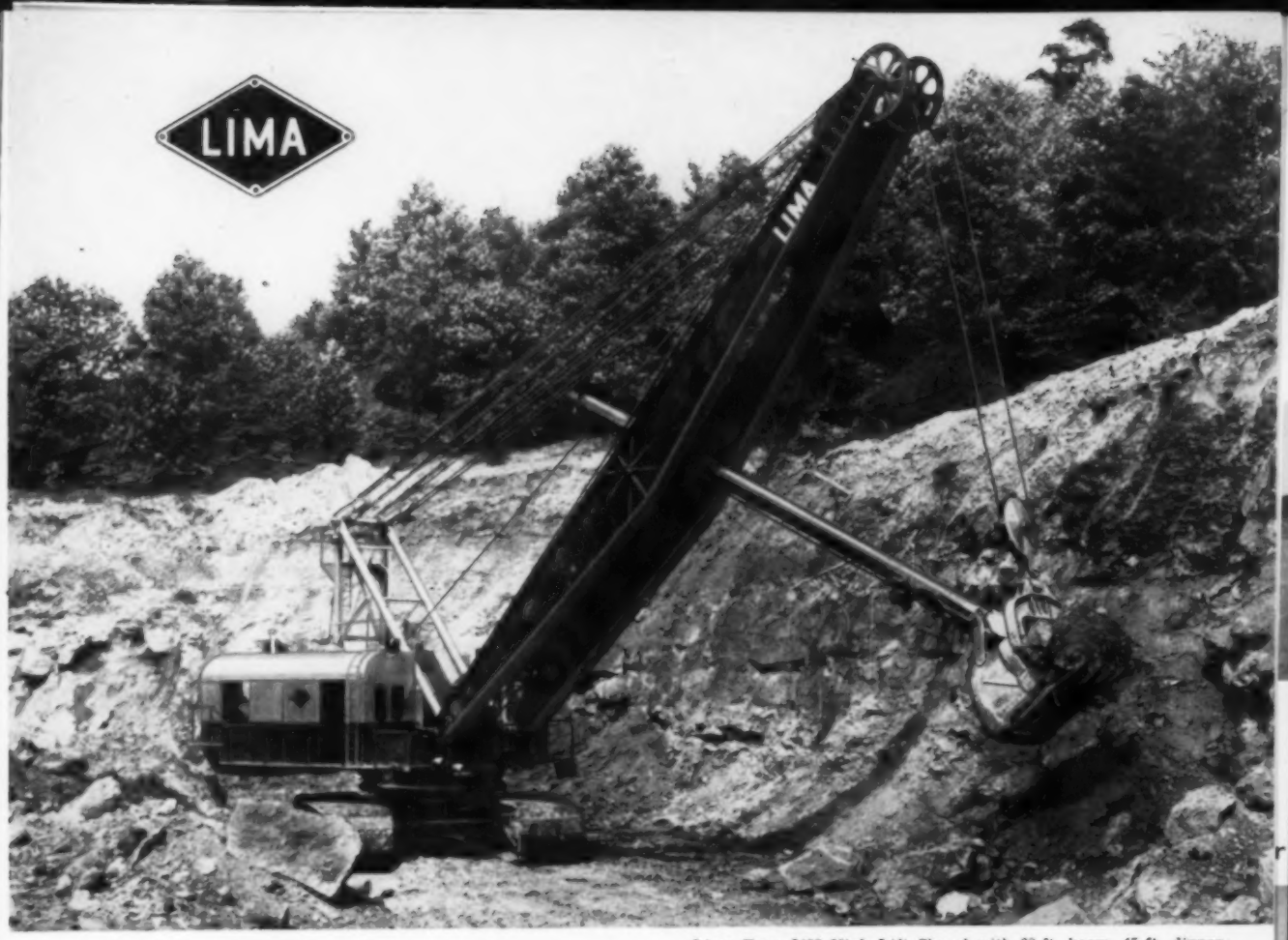
Partners in Dependability with Hercules® Explosives

HERCULES POWDER COMPANY
INCORPORATED

Explosives Department: 900 Market Street, Wilmington 99, Delaware

Birmingham, Chicago, Duluth, Hazleton, Joplin, Los Angeles, New York, Pittsburgh, Salt Lake City, San Francisco

KR58-1



Lima Type 2400 High Lift Shovel with 60-ft. boom, 45-ft. dipper handle and 4½-cu. yd. bucket mining coal at Holloway, Ohio.

There's a power-packed LIMA to handle every mining job

Profit comes fast with Limas—a complete line of rugged machines from ½ to 6 cu. yds. As hundreds of operators have found, these quality-built machines mean faster digging cycles, easier handling, less downtime and greater production.

Here are some of the quality features that keep production high and downtime low on Limas:

Crawlers are wide and long for solid ground contact and ease of handling in close quarters.

Tread rollers have specially hardened rims to resist wear . . . have dirt seal rings and retainers.

Drums are extra-wide with large diameters . . . a big advantage when operating as a dragline, crane or high lift shovel because of the greater cable capacity.

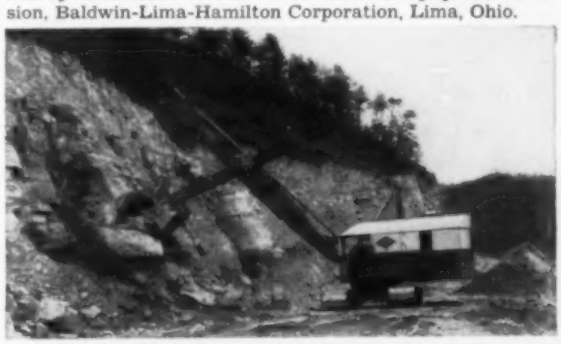
Anti-friction bearings at all important bearing points including the drums.

Extra-large air operated clutches respond instantly to the slightest movement of the controls—lessening operator fatigue.

Torque converter gives greater output, reduces shock loading, prevents engine stall . . . cushioned effect of drive lengthens cable life, reduces machinery maintenance. Standard equipment on Type 2400.

All gears, smaller parts and shafts that are subjected to extra wear are flame or induction hardened for longer life.

Find out more about built-for-profit Limas from your nearby distributor or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.



Lima Type 1201 Shovel, equipped with a 42-ft. boom, 32-ft. dipper handle and 2½-cu. yd. bucket, stripping coal at Anawalt, West Va.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA Construction Equipment Division, Lima, Ohio

BALDWIN · LIMA · HAMILTON

Shovels • Cranes • Draglines • Pullshovels • Roadpackers • Crushing, Screening and Washing Equipment

BALDWIN BLH LIMA-HAMILTON

5811

don't dilute your Mack

USE GENUINE MACK PARTS

Makes us wince to think about it. Truckers who'll take a sweet piece of equipment—their Mack—and water down its efficiency with any old replacement parts.

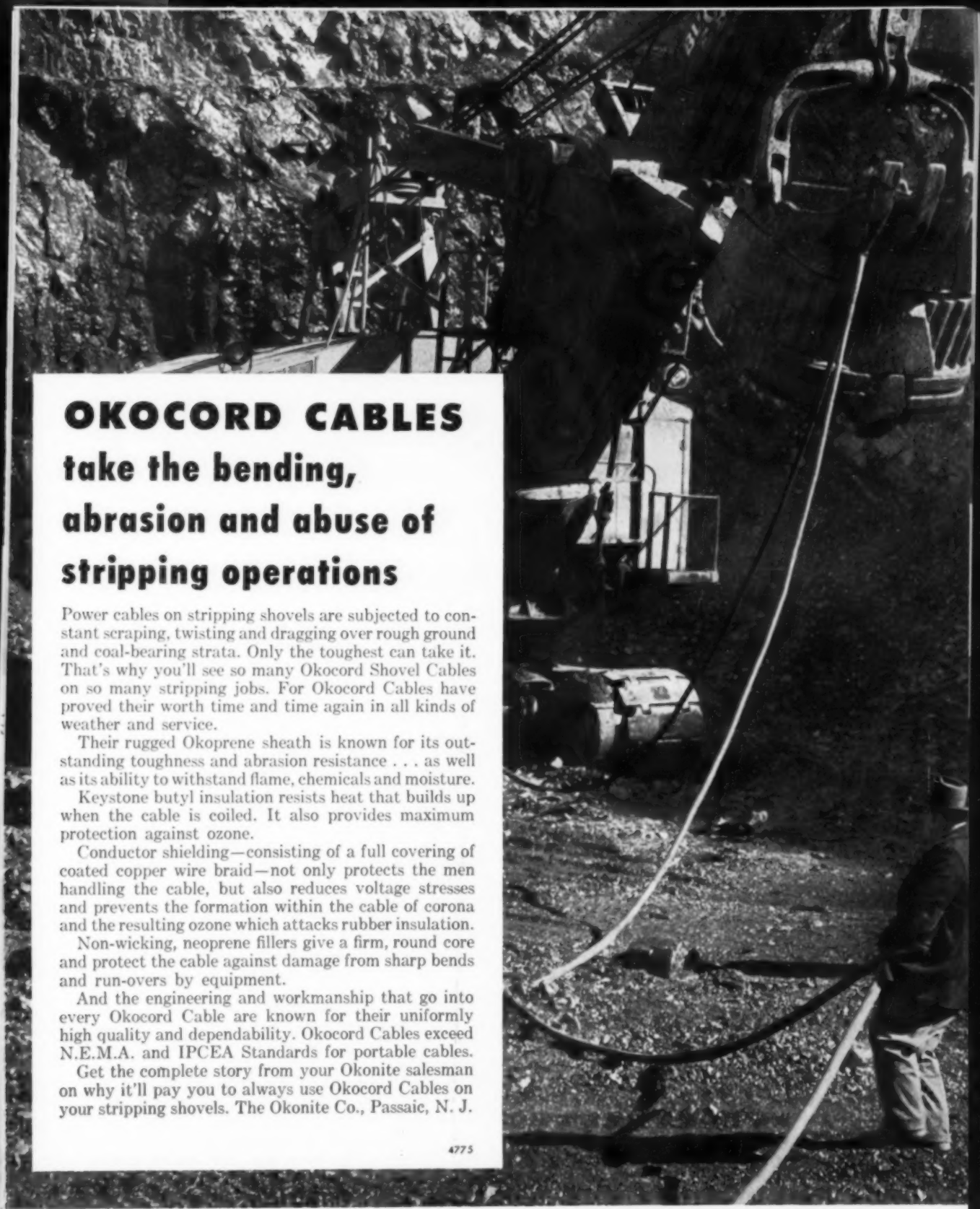
When we build a Mack, the parts we put in are the best our engineers can make or buy. Sure . . . other parts may "fit the hole" . . . but there's only one that will do the job the way it should be done—the one you get when you order "Genuine Mack Parts."

Just keep reminding yourself. You operate the world's best trucks when you own Macks. Keep 'em that way with the world's best parts . . . *made by Mack . . . made for Macks.* Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

5645

MACK
first name for
TRUCKS

EVERYWHERE A MACK GOES . . . THERE ARE MACK PARTS . . . AND MACK SERVICE



OKOCORD CABLES
take the bending, abrasion and abuse of stripping operations

Power cables on stripping shovels are subjected to constant scraping, twisting and dragging over rough ground and coal-bearing strata. Only the toughest can take it. That's why you'll see so many Okocord Shovel Cables on so many stripping jobs. For Okocord Cables have proved their worth time and time again in all kinds of weather and service.

Their rugged Okoprene sheath is known for its outstanding toughness and abrasion resistance . . . as well as its ability to withstand flame, chemicals and moisture.

Keystone butyl insulation resists heat that builds up when the cable is coiled. It also provides maximum protection against ozone.

Conductor shielding—consisting of a full covering of coated copper wire braid—not only protects the men handling the cable, but also reduces voltage stresses and prevents the formation within the cable of corona and the resulting ozone which attacks rubber insulation.

Non-wicking, neoprene fillers give a firm, round core and protect the cable against damage from sharp bends and run-overs by equipment.

And the engineering and workmanship that go into every Okocord Cable are known for their uniformly high quality and dependability. Okocord Cables exceed N.E.M.A. and IPCEA Standards for portable cables.

Get the complete story from your Okonite salesman on why it'll pay you to always use Okocord Cables on your stripping shovels. The Okonite Co., Passaic, N. J.

4775

where there's electrical power . . . there's **OKONITE CABLE**

UNDERPASSING rope belt is easy. Wire ropes support troughing section. Return-idler stands (left) are suspended from special supports bolted to roof. Two 10-in by 20-ft channels were needed to support conventional belt.

Rope Belts Boost Efficiency at

No panline needed . . . Rope suspension of idlers provides impact cushioning . . . Extension time cut . . . Less spillage . . . Better troughing . . . Faster moves in continuous mining . . . Greater flexibility in mining.

By A. E. Flowers
Associate Editor, *Coal Age*

FAST BELT EXTENSIONS, lower maintenance and supply costs, less supply-line traffic and greater flexibility in mining are top gains achieved with rope belts at mines of the Peabody Coal Co. New belts at Peabody have passed operating tests with flying colors.

After better than 30 mo experience with a 48-in main-entry, 42- and 36-in panel rope belts plus over 1 yr with a 36-in self-propelled extensible rope unit, Peabody lists these benefits:

1. No panline is required. Hence less labor and time is needed to move or install a conveyor.
2. Rope suspension of idlers provides impact cushioning of the belt and permits use of a lighter carcass.
3. There are fewer installation problems in dips or rolls.
4. Underpassing is simplified.
5. Belt extension time is cut significantly.
6. There are fewer problems with side loading.
7. There is less spillage because the belt conforms to the load and there is better troughing.
8. The belt can operate with more misalignment than a conventional unit.

Mainline Service

Peabody's largest and longest rope belt is a 48-in unit that extends 4,000 ft in the Main South Entry of No. 10 mine. The entire mine output, or 16,000 to 18,000 tons of raw coal per day, will eventually be carried on this conveyor.

This unit is not only the longest and widest rope belt in service, but also is traveling at 700 fpm, believed to be a new high in underground belt speed.

Peabody estimates that a saving of $50,000 was made in comparison to the cost of installing a conventional 48-in conveyor. This saving at Peabody No. 10 resulted from a number of sources:

1. Only 18 mine cars were needed to haul the entire 4,000 ft of conveyor. It took 60 cars to haul 4,000 ft of conventional panline.
2. It took only 58 man-shifts to distribute and install 4,000 ft of rope belt compared to 180 man-shifts for a conventional unit.
3. Life-sealed bearings eliminate the need for greasing.

The 48-in main-entry rope belt is operated by a standard Joy tandem drive powered by a 300-hp 4,000-V motor. Electrical controls are housed in a Westinghouse skid-mounted control unit.

The 48-in conveyor is now handling the total mine output of 16,000 to 18,000 tpd it receives coal from two 42-in rope belts. These discharge onto a Joy 48-in transfer belt which carry it 45 ft to the tail section of the 48-in rope conveyor. A 36-in rope belt, traveling 450 fpm, is now set up behind the 48-in unit while the South Mains are being developed.

Pioneering The Belt

The pioneer work with rope belts

PANEL BELT, 36 in wide, carries full load to main entry. Chain-link idlers adjust troughing of belt to conform to load. Peabody has a total of 20,000 ft of panel and mainline rope belts.

Peabody Coal

was done at Peabody No. 17, at Pana, Ill. The rope suspension concept in belt conveyors was developed through the cooperation of engineers and operating men at Peabody in conjunction with the Goodman Mfg. Co.

Peabody's first rope belt was a 36-in unit, which was installed in March, 1955. It was much different from today's design. Carrying idlers were placed in a bulky 75-lb frame which was placed between the two ropes. As clumsy as this design was, it demonstrated the practicability of a quick, easily installed belt conveyor.

From here on, development was a process of eliminating the unsuccessful features and designing and applying new ones. A study of the top, or troughing, idler assembly showed that more flexibility was needed. This led to the birth of the chain-link unit.

The chain-link troughing assembly has three 2½-in rollers connected by ¾-in chain links. Each end is attached to the two ropes by a specially designed clip and spike. This design permits complete flexibility and adjusts the belt trough to conform to the load. It also automatically centers the load on the conveyor and eliminates the need for impact idlers at coal loading points.

Introduction of the chain-link assembly permitted a reduction in the diameter of idlers. A smaller idler was found satisfactory since the rope supports yielded under load. Thus there was no need for a larger idler to provide a larger surface for the belt to pass over to ease the impact load on the shaft and bearings.

Many test runs were made. Down time, installation time and time required to extend the belt 150 ft were time-studied. Extension time was the key item that started the company on the route to the new conveyor. Peabody wanted a conveyor that could be extended easily between shifts. Results of the tests were more favorable than the fondest hopes. A 150-ft extension was made in only 60 min with the use of only a hammer.

Peabody's Management Team

M. C. Kelce ..... President
H. C. McCollum .... Vice President, Underground Operations
Joseph Craggs ..... General Field Superintendent
Keith McCann ..... Assistant General Field Superintendent
Geo. Gilmartin . Superintendent, No. 10
T. Shimkus .... Superintendent, No. 17

Larger Belts

Results with the original 36-in rope belt spurred the company on to try larger units. A 500-ft section of 42-in conveyor was built by the Goodman Mfg. Co. and installed at Peabody No. 10. This unit proved as successful as the 36-in belt and only slight changes were needed. These included changing the rope spreader and reducing the diameter of idlers from 5 to 4 in.

When the 42-in rope belt was installed, Peabody learned that it could be suspended from the roof without intermediate support at a haulage underpass. All that is needed now is a support for a return idler stand at each side of the underpass. This support is made up of an angle iron to which is welded two tubular sections that hold the return idler. One of these can be put in place in a few minutes. To suspend a conventional belt, two 10-in by 20-ft channels were needed to support the belt over a track underpass. These were suspended between crossbars and stands were fastened to the channels.

DRIVE SECTION of extensible rope belt is crawler-mounted. Discharge end can be adjusted over panel belt.

TAIL SECTION is self-propelled. Drums hold 600 ft of rope. Man at right adds idlers as operator advances tail.

BELT TAKEUP behind drive holds 100 ft of belt. Slip-joint pipe supports are easily assembled or dismantled. Unit has three 10-ft sections.

Facts About the Ropex Extensible Belt

Drive: 25-hp 250-V DC; crawler-mounted with 7½-hp motor for each crawler. Tramming speed, 80 fpm. Screw jacks for adjusting over panel belt. Separate 5-hp winch for takeup.

Takeup: Three 10-ft slip-joint sections; holds 100 ft of belt.

Tail: Hydraulically operated with one 25-hp motor driving four pumps. One pump for each rope drum, two for slow tram. All four operate high-speed tram. Automatic tensioning of ropes. Reels hold 600 ft of ⅝-in rope. Tramming speeds are 30 and 80 fpm.

Bridge: 24 ft long, built up from 6-ft sections; can be any length desired; 14-ft travel over tail. Belt speed, 425 fpm.

Carrying Section: Troughing idlers placed at 5-ft intervals on ropes. Return idlers set in stands on 10-ft centers.

The wire ropes of a panel or main-entry conveyor are usually anchored in spans of about 150 ft, depending on the length of extension needed. The anchor is a specially designed base plate and leg which is bolted either to the roof or floor. The two ropes are then secured to the anchor by a turnbuckle. Tension in the rope at the time of installation should be 1,200 to 1,500 lb for a 36-in belt.

Extensible Unit Developed

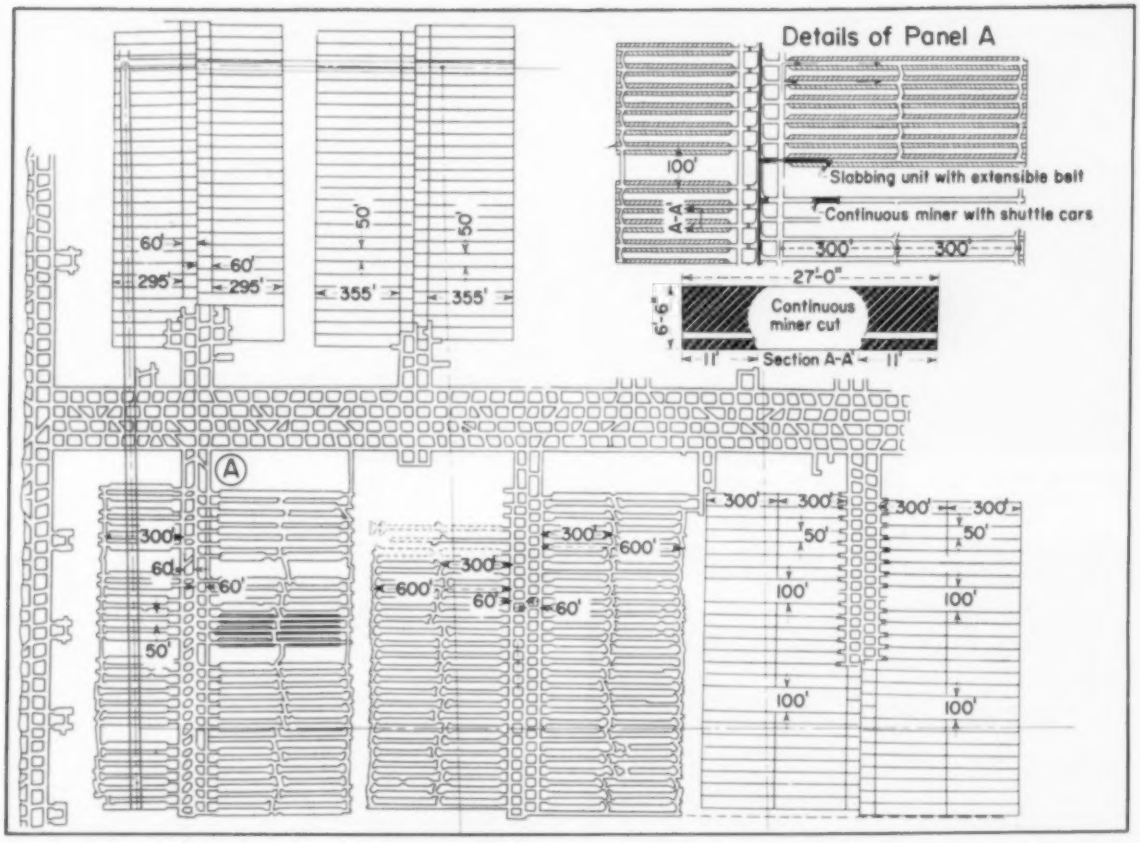
In May, 1955, preliminary sketches were made of the essential elements of an extensible rope belt for use with a continuous miner. Peabody engineering and operating men, and the Goodman Mfg. Co. contributed ideas for the new unit. By the end of May working blueprints were completed and fabrication was begun.

A month later, the extensible rope conveyor was ready for testing. To spot design defects that might cause operating problems underground, the unit was put through a series of tests on the surface.

To provide a link between the self-propelled tail section and the continuous miner, a 24-ft bridge conveyor was added. Two 20-ft sections of pipe form the side frame. Between these are mounted the head and tail pulleys. The unit can pivot 180 deg with the conveyor line and travel 14 ft back and forth over the end of the belt. Belt speed is 425 fpm.

The 36-in extensible unit is similar in design to the regular 36-in rope belts. The major difference is that the two ropes are supported at 10-ft intervals and no rope spreaders are used. The head and tail sections are self-propelled. Belt speed is 455 fpm and carrying capacity is 9 tpm.

Belt is stored at the mobile head section in a wheel-mounted takeup carriage that moves back and forth along parallel pipes. Belt tension is maintained by a 1-ton electric hoist which is connected to a pre-set spring. Two limit switches, connecting to the spring, control the hoist. When the spring tension becomes greater or less than the limits, the switches will operate the hoist to extend or retract the belt.



MINING PLANS includes driving rooms with continuous miners and extensible rope belts. Slabbing unit takes slices from both ribs after rooms cut through. Room depth was varied in experimental work to develop the best system for conditions.

The belt takeup section is made up of three 10-ft parts. Both vertical and horizontal members are slip-joint fits for easy assembling or dismantling. In moving the unit to a new setup, 100 ft of belt is left in the head. The takeup carriage is pulled into the head and any extra belt is laid on top. Then the knock-down takeup section is taken apart and piled on top of the head section. The unit is then trammed to the new site. Tramming speed is about 80 fpm.

The tail section also is crawler-mounted and includes the tail pulley, wire-rope reels and carriage supporting the bridge conveyor. This unit is designed so that the rubber belt travels over chain-link idlers supported similarly by wire rope to the remainder of the conveyor. This design feature eliminates impact problems where coal drops from the bridge to the extensibe belt. Thus belt damage is decreased.

In the original tail section, tramming was done by electric motors and rope reels were powered hydraulically. Later revisions made the complete assembly hydraulic with a braking system maintaining constant tension on the wire ropes.

The hydraulic system is operated by a 25-hp motor driving four hydraulic pumps. Two pumps maintain the proper rope tension and the other two operate the slow tramming. High-speed tramming is achieved by throwing all four pumps into the tramming circuit. If the hydraulic pressure should bleed down, belt tension would be maintained mechanically by a ratchet lock.

There is an intrinsically safe relay-operated control circuit between the head and tail sections. This circuit performs two jobs:

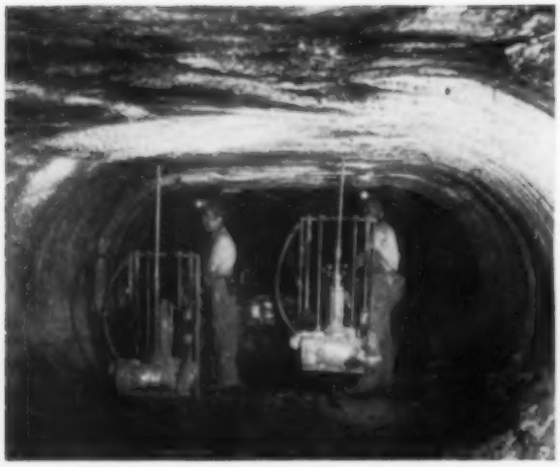
1. Permits the operator of the tail section to start or stop the Ropex conveyor.

2. Operates a two-position switch that first turns on a light when the belt is fully extended. If the continuous miner continues to advance, it stops the belt.

The coal-carrying job is done by Goodrich 3-ply 1/8x1/8 32-oz belt. Each 100-ft section of belt is fitted with reversible Flexco splices that permit the sections to be joined with either side up, thus simplifying belt extensions. The use of 3-ply belt also reduces the cost of the conveyor.

Section Crews at Peabody

Continuous Mining (one machine)	Slabbing
2 continuous miner operators	2 loader operators
1 Ropex tail-section operator	2 cutters
1½ repairmen	2 drillers
½ rockduster	2 shotfirers
2 supplymen	2 roof-bolters
1 foreman	1 timberman
8 total	1 utility man
	3 shuttle car operators
	1 repairman
	1 foreman
	17 total



ROOF SUPPORT is provided by 6-ft roof bolts installed with twin-arm rotary machine as soon as room is completed.

SLAB CUT, 11 ft deep, is made along both sides of room with universal cutter. Cut is spragged as quickly as possible.

SPECIAL WINCH on rear of cutter helps pull it through cuttings in narrow room. Unit is powered from hydraulic system.

CRAWLER-MOUNTED drill unit has arms extending from both ends. Holes are placed at top and bottom of slab cut.

How Belt Is Added

Belt is always added on the top side. Here is how the extension job is done:

Each edge of the top side of the belt is clamped near the takeup section with a pair of vise-grip pliers with wide jaws. The pliers in turn are held to each of the wire ropes by a wire grip. This is done so that the slack in the top side will not run back when a splice is separated. It also permits the belt to be stopped with a load on it.

Two crew members and the repairmen can make a splice in 3 to 5 min. Belt is stored on a power winder parked in a breakthrough near the takeup section. Belt is fed from the storage spool through a jack-mounted gate that transfers the belt from a vertical position on the reel to a horizontal position on the conveyor.

Peabody reports that the greatest advantage of the extensible rope conveyor, aside from ease of installation, is the small quantity of material needed to extend the conveyor. All that is required are chain-link troughing assemblies on 5-ft centers and stands every 10 ft.

Mining With the Extensible Rope Belt

Peabody Coal had two Ropex extensible rope belts operating at No. 17 mine. A total of 20,000 ft of panel and mainline rope belts, ranging from 36- to 48-in units, is in service at Peabody.

At Peabody No. 17, two Ropex units were assigned to one panel. Other equipment in the section included two Goodman 402 continuous mining machines and one pillar-slabbing unit. The slabbing unit followed the continuous miners after rooms had been driven and took a slice from each rib. Equipment in the slabbing unit included a Joy 10-RU cutter, 11-BU loader with wide loading head, three 10SC shuttle cars, Dooley coal and roof-bolting drills.

Each of the two continuous miners was teamed with an extensible belt in room development. The first Good-

1. Fingertip electric controls

2. Point-of-action electric motors

3. Hinged body design . . . no frame, no springs

4. Big, multi-disc air brakes on all 4 wheels . . . selective brake control locks front or back wheels, or both

5. Interchangeable tires and wheels, front and rear

6. All-steel body . . . with tri-level bottom

7. Wide bowl, with low rear entry, makes loading easier, faster . . . with less spillage

Cut your pit costs

with high-production Tournapull® Rear-Dump haulers

Capable of high-production in all materials, with a minimum of maintenance, LeTourneau-Westinghouse Tournapulls with Rear-Dumps give you more for your money in productive hours worked . . . more in tons moved . . . at lower cost. Here's why!

Simplified construction

Rear-Dump construction is radically simplified from that of conventional haulers. In place of a foundation frame and body sub-frame, Tournapull prime-mover and trail unit are hitched together by means of a rugged, high, horizontal yoke. Yoke pivots horizontally on kingpin at front . . . then extends back along the sides of the bowl, where it is pivoted vertically just above and ahead of rear wheels.

Heavy-duty bowl resists shock, abrasion, and crushing damage of big chunk-rock dropped by excavator.

Big tires

There are no dual tire or mixed size problems. Big, single, low-pressure tires adequately absorb the shocks of rough off-road travel and shovel loading. Troublesome springs, spring hangers and tie-rods that require frequent maintenance and replacement are eliminated. Long-wearing tires are interchangeable all around . . . one spare serves an entire fleet.

2-wheel prime-mover

Front-wheel drive and kingpin-type steer further simplify Tournapull construction. A multitude of trouble-causing parts are eliminated. No longer must power be carried back to the rear through a long driveshaft . . . with its inherent bearing, universal joint, and lubricating problems. No longer is steering handled by small front wheels subject to misalignment from "bulldozing", as they try to get out of ruts. All compact machinery inside prime-mover case is readily accessible for quick adjustment, easy servicing.

Simple, safe dump action

A touch of electric switch on dashboard instantly activates point-of-action body-hoist motor. Entire dump is under power control — there is no free fall. There's no delay for hydraulic pressure build-up, no shock-loads — as with gravity dumping. You save on maintenance time, too, because there is no hoist maintenance to check . . . only a few places to inspect and lubricate.

For complete information

Find out how these savings can put money in *your* pocket. There are three LeTourneau-Westinghouse Rear-Dump sizes to fit your requirements, with 11, 22 and 35-ton capacities. Write for information.

E-1409-M-1

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

ADDING BELT to extensible unit takes only 3 to 5 min. Belt is clamped and new piece is installed on top side.

SPECIAL GATE mounted on jack transfers belt from vertical position on reel to correct position on conveyor.

ROPE TENSION is kept at proper value by jack-pipes and turnbuckles.

TERMINAL ANCHOR for ropes is mounted slightly ahead of tail section. Similar anchors are used at 150-ft intervals in panel belts.

man 402 was originally served by two shuttle cars. They later were replaced by a Ropex extensible belt on Nov. 15, 1956. On the same date the second Goodman 402 continuous miner went into service in the same section.

Developing Mining Methods

In planning for the use of continuous miners and extensible rope belts, Peabody's officials felt that changes would be necessary in mining methods to get the greatest possible efficiency from the equipment. As a result, steps were taken to set up an experimental mining program. The basic plan was to design a system whereby the continuous miner would be driving straight ahead as much as possible and with a minimum of breakthroughs. This method also would make ventilation easier because fewer stoppings would have to be built.

But before taking positive steps to start the experimental work, Peabody discussed the plans with the Illinois Department of Mines and Minerals. The company then asked and received permission to do experimental mining with breakthroughs cut on 300-ft centers. To provide fresh air at the face, a booster fan was proposed for each working place.

The next step was to lay out a mining system on the basis of the plan approved by the Illinois Department of Mines. Peabody's first plan was to drive three headings on 60-ft centers to a depth that would permit 27 rooms, on 50-ft centers, to be mined on each side. Rooms on the left side were projected 600 ft deep and those on the right 300 ft. Room breakthroughs were laid out on 300-ft centers.

The three headings were driven to the projected depth with a Goodman 402 boring-type continuous miner that cut an oval-shaped opening 12 ft 6 in wide. Breakthroughs were staggered left and right on 50-ft centers to match future rooms. A Goodman rope belt was installed in the center heading to haul coal to mine cars on the sidetrack at the

Works for you...

...runs to its next job...

Let your neighbor share the cost of your new tractor

...and works for a neighbor

If the high-speed performance of a big, modern, rubber-tired tractor appeals to you — but your work-load doesn't seem heavy enough to justify the investment — here's a money-saving idea: *let your neighbors share your cost*. A modern tractor-on-rubber *works* so fast, *travels* so fast, that it can serve *several* users.

There are various ways to handle this "cost-sharing". Some owners rent their rubber-tired tractors to nearby pits and plants for a couple of hours a day, on a set schedule. Some furnish tractor-and-operator on a "call when needed" basis. Others include several stops on a daily cycle.

Must meet these requirements...

Whether or not the plan works depends on the speed and performance of your tractor. First, it must get *your* work done... quickly, economically. The tractor must be fast and mobile, so you can dispatch it to your "customers" easily. And, with this extra schedule of work, it must be able to "take it".

With these requirements in mind, consider how LeTourneau-Westinghouse Tournatractor® lends itself to this type of operation:

210 hp... excellent traction...

Tournatractor gets *any* work done in a hurry. With 210 hp, and excellent traction from 4 big, low-pressure tires, it matches or tops slow crawler-tractors in "push-power", in all but rarely-used speeds under 2 mph. Fast acceleration, big, sure-stop brakes, independent steering clutch speed up maneuverability. And its constant-mesh transmission gives you *instant*-shift, *non-stop* speed selection.

Versatile, too, Tournatractor can be equipped with dozer blade, Angle-dozer®, root rake, snow plow, side boom, tree stinger, push block, winch, railroad coupler. It will pull all standard drawbar tools. With a rear-mounted power-control-unit, it will operate cable-controlled scrapers, other cable-type attachments.

Drives to work anywhere

Tournatractor *runs* from job-to-job under its own power... doesn't need ramps, trailers, trucks. Its big tires roll over paved roads, open fields, rails, with equal ease. And its 17 mph speed lets you reach a pit 4 miles away in only 15 minutes!

Long hours, heavy work, never hurt rugged Tournatractor. Owners' cost records prove it to be remarkably economical to maintain. Its shock-absorbing tires, heavy steel framing, and load-smoothing torque converter keep this unit working productively day after day, month after month.

Talk over this double-duty profit possibility with your LeTourneau-Westinghouse Distributor. And ask for a demonstration of Tournatractor.

CT-1648-MQ-1

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

SIDE LOADING is no problem with rope belt. Here shuttle car discharges into modified elevator feeding panel rope belt.

WET ROCKDUSTING is done on shift in fast moving mining areas. Skid-mounted machine is located back from face.

AUXILIARY FAN set up in intake air in heading provides fresh air for rooms.

POWER SAW speeds timbering in slab cuts. Posts are set on 4-ft centers.

mouth of the entry. Shuttle cars provided a haulage link between the continuous miner and the belt conveyor.

After the entry was developed, the continuous miner was trammed out to the center line of the first room in the left heading. This was at a point 198 ft from the main entry and in the return-air side of the entry. Thus each succeeding room would be on fresh air. A pair of rooms was advanced the width of the miner for 300 ft with one continuous miner and connected with a breakthrough. These were driven another 300 ft to the projected depth and connected with a second breakthrough. Before the machine was moved out a bleeder was cut through to the main entry. This connection established a permanent fresh-air circuit for the rooms.

While a room was being advanced to a breakthrough, fresh air was supplied by a Jeffrey 16-in centrifugal fan set up in the heading. Air was delivered to the face through a 12-in tubing suspended from the roof. Approximately one-third of the fresh air flowing through the entry was directed into the room.

As soon as a room was completed and equipment removed, 6-ft expansion-type roof bolts were installed on 4-ft centers. Using a Dooley twin-arm unit, two men handled the bolting job. When five or six rooms had been advanced and roof bolts installed, the slabbing unit started in Room 1. Beginning 30 ft from the mouth of the room, the 10-RU cutting machine made a cut 18 in above the floor to a depth of 7½ ft along both ribs. This late: was made 11 ft deep.

Because the cutting operation filled the floor with fine coal which made tramming difficult, the company added a winch to the cutter. Mounted at the rear of the machine, the unit is powered by a special hydraulic motor driven from the cutter's hydraulic system. To further ease travel over the cuttings, large-diameter wheels were installed on the cutter.

After the slab cut was completed, a twin-armed Dooley 580 drill mounted on special crawlers that provide 14 in of clearance drilled two rows of blastholes. One row of holes was placed above the cut and the other below it.

Approximately one-third of the blastholes were charged with Hercogel permissible at one time. Hercules 5-MS delays were used between holes. Two men charged the holes and set off charges between the second and third shifts. Only two shotfirers and a foreman were in the mine when explosives were detonated.

The two complete slab cuts were broken down before loading took place in a room. To increase capacity, the Joy 11-BU loader was fitted with a special loading head that is 2 ft wider than a standard unit. A bridge conveyor and a 36-in Goodman Ropex extensible belt delivered coal to the entry belt. As soon as sufficient area was cleared, the timber crew set wooden posts on 4-ft centers along both ribs to provide additional roof support.

The continuous miner was operated two shifts and the loading unit only on one shift. This was done to keep the two units in balance.

After all of the 600-ft rooms were

How self-powered scrapers help cut mine operating costs

Tournapulls may be self-loaded, push-loaded, or shovel-loaded. The 9-yard "D" shown here hauls at speeds to 29.5 mph, unloads in seconds, makes complete turn in 26 feet. Simple electric controls and big 4-wheel air brakes permit rig to work safely at high speeds in tightly restricted quarters.

Read the following list of mine-scraper applications . . . analyze these scraper economies for your open pits:

1 In auxiliary stripping, where overburden is so thick that the wash or earth must be removed to allow boom-type equipment to work within its economical limits.

2 Where spoil room for boom-tool operations is inadequate; where outcrop is bothered by property lines, highways, railroads, pipe lines, power lines and undiverlable streams.

Rigs make 180° turns, in less than machine's length, operate in tight quarters as shown above. Tournapulls keep working in tough going when other self-powered scrapers bog down. When one wheel slips, exclusive power-transfer differential automatically transfers power to wheel on firmest footing. Positive geared steer on kingpin pivots prime-mover from side to side, "walking" drive wheels to fresh footing.

3 Widening a bench at the side of the pit to provide greater casting area for shovel or dragline.

4 Stripping wet top-layers of earth, which might slough and cause slides into a shovel cut.

5 Cutting the initial box-cut, depositing the spoil out-of-the-way of later dragline operations.

6 Stripping or mining small or isolated veins that do not warrant the expense of moving large excavating equipment to the site.

7 Stripping hillside and hilltop operations...self-powered scrapers particularly adapted for this type of work.

8 Cutting new beds for temporary or permanent stream diversions; building dams and settling ponds.

9 Building grades for railroads and for truck haul-roads.

10 Construction and maintenance of ditch and drainage systems.

11 Grading around mine buildings and mine location housing.

12 Land-fill disposal of refuse.

13 Stockpiling of coal . . . spreads in even layers, compacts while hauling.

14 Supplementary hauling of ore, coal, or overburden...open-top scraper can be shovel-loaded and used as a truck-type hauler.

15 Mining lean ore, previously abandoned, in widely scattered or isolated areas.

16 Stripping overburden where level piling of spoil is required.

17 Stripping shallow overburden which does not justify expense of installing and operating major excavating equipment.

18 Leveling spoil piles for drainage, reforestation, farming, etc.

19 Removing and replacing top-soil for reclamation purposes.

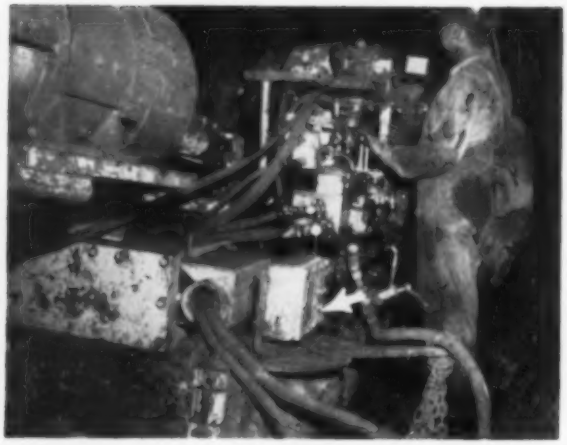
If you have any of the above dirt-moving problems . . . write us or check with your nearest LeTourneau-Westinghouse Distributor. We'll be glad to have our experienced field engineers analyze your operation and propose suitable procedure and equipment for most economical handling. Our rubber-tired prime-mover scraper combinations are available in three sizes: "D" . . . 138 hp . . . 9 yards heaped capacity; "C" . . . 210 hp . . . 18 yards heaped capacity; BIG "B" . . . 293 hp . . . 27 yards heaped.

Tournapull—Trademark Reg. U.S. Pat. Off. P-1508-M-1

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit



PROTECTION is provided by ground-fault detector in controller. Reset and test buttons (arrow) are mounted externally.

Ground-Fault Detector Protects Men and Equipment

Protection of men and equipment is simplified with Ensign Electric ground-fault detector. Approved by the USBM, these units have been in use since April, 1957, on two Goodman 402 continuous miners. They are used in place of a conventional grounding system with 3-conductor cable.

The device consists of two units, a relay housing and a pushbutton station. The relay housing consists of an insulated box mounted inside the controller of the continuous miner. The pushbutton station is mounted externally and has "Reset" and "Test" buttons.

If a ground fault of 40 V or more occurs, the device de-energizes the circuit until the trouble is corrected. The unit cannot be reset until the ground fault is removed.

completed on the left side, 300-ft rooms were mined off of the right side. Slabbing was done in the same manner as previously done in rooms on the left side.

Continuing the experimental work, the company made several changes in the mining plan in the second room panel. These included driving all rooms 600 ft deep and eliminating the blind rooms. This system was designed to yield more coal from the same number of feet of heading development.

Mining advanced without hitch through 27 rooms on one side of the entry and through 22 rooms on the other side. At this point roof weight became noticable and after the room was slabbed and the next two rooms driven nearly to full depth, the roof conditions became so bad that the three remaining rooms were not driven.

As a result of this experience a slight change was made in the mining plan in the next panel. To provide more roof support, rooms 9 and 18 on both sides of the entry were not driven. All other rooms were driven 600 ft deep.

Under the roof conditions and the work schedule, the deep rooms did not work out as well as had been expected. Hence the company decided to reduce the depth of rooms to 295 ft. No blank rooms were left and no changes were made in room centers or slabbing procedures. This system worked successfully but the company felt that under existing conditions rooms could be driven somewhat deeper; consequently, plans were changed once more to the system now in use.

Today's plan includes driving three headings as before, then turning rooms on 50-ft centers. All rooms are driven to full depth of 355 ft but slabbing is not carried out in rooms 7, 11 and 21. Only one side of the rooms adjacent to these rooms is slabbed, thus leaving two full-sized room pillars at rooms 7, 11 and 21.

Results of the Experiments

Peabody already has gathered considerable valuable information from the new mining layout. The work proved that the mining system can be employed successfully in Illinois mining conditions. At No. 17 mine, the equipment was placed in an area with the worst roof conditions and it passed the test with flying colors. But to be successful, Peabody officials say that timing is important. For example, if the mine works three shifts, five days per week the rooms can be driven deeper. Timing of the slabbing unit also is not nearly as critical when work is steady. The company reports that the ideal system is to operate the continuous miners three shifts and the slabbing unit two. This provides balance between the two distinct operations.

One important feature about the system is that mining is flexible. For example, slabbing operations can be slowed as idle periods, such as the miner's vacation, draws near. Thus a minimum of blasted coal and unsupported roof is left over the idle period.

It takes about three shifts to load the two slab cuts containing about 2,500 tons of coal. It is not uncommon for a crew to load 1,000 tons per shift. During the month of September, 1957, one crew loaded an average of 1,105 tons per shift. The continuous miner crew produces an average of 500 tons per shift from the room work.

Power

It takes a lot of power to operate a continuous miner and slabbing section. For example, the original section equipment, including one Goodman 402 miner, one Joy 11-BU loader, one 10-RU cutter, one Goodman Ropex belt, one Dooley coal drill, one roof-bolter, and two Joy shuttle cars, had a total of 516 hp. Watt-hour charts at the 300-kw m-g set in the section showed peak demands up to 1,800 amp, while the minimum was seldom less than 1,000 amp. Another continuous miner and Ropex belt boosts section horsepower to 711.

Power is carried to underground substations through 4,160-V Type SHD cables. After conversion to 270-V DC, power is distributed to the section by two 1,000,000-cir mil cables. Two 1,000,000-cir mil cables also are provided as returns.

Substation locations are planned so that the DC circuit is never greater than ½ mi. The m-g sets are mounted on rigid self-supporting bases with 5-in wheels for easy moving.

Latest Stoper Drill Development Simplifies Roof Bolting in Low Coal

Le Roi-Cleveland S-20 Vac-Nu-Matic stoper, with new feed principle, is only practical machine in seams from 36" down to 26". Other sizes available for any seam height.

28-inch feed S-20 weighs only 65 pounds. It is the lightest dust-collecting type stoper available—operators say it's easier to use.

The revolutionary S-20 stoper is designed especially to provide a better way of producing roof-bolt holes.

Low coal or high coal makes no difference to this machine. It lets you put your roof-bolts wherever you need them — even in 26-inch coal. And high drilling speed along with light weight and a positive dust-collection system helps your miners get the work done faster.

New feed principle provides low overall height and longer travel. The S-20's feed consists of an air piston combined with a chain in such a way that the travel of the machine is double the travel of the feed piston. As a result, it drills a deeper hole with one steel change than a standard stoper does with two changes.

Because it does away with at least one steel change and in some cases two, this longer travel saves roof-bolting time.

The low overall height is obtained because the S-20 is the only stoper that starts its feed at the bottom of the machine. The starting height, regardless of feed length, is always 16½ inches.

Dust collection is instantaneous. There are no hoods or tubes to handle or adjust, when your miners use the S-20 Stoper. The cuttings and dust are pulled through the drill steel instantaneously and ejected through the side of the chuck housing into the dust box—no cuttings go through the machine itself.

There's complete absence of dust because the S-20 system pulls a high vacuum. It uses only 18 cu. ft. of air at 80 lbs. pressure to pull a static vacuum of 16½ inches of mercury or a fluid vacuum of 13 inches while the machine is running. Wet top presents no problem.

New design speeds roof-bolting operation. The S-20 has been in the field for more than a year, working in all types of coal mines. According to the evidence piled up during this period, S-20 users not only roof-bolt areas heretofore impossible to get at — they also do the work faster.

Features that contribute to this increase in efficiency are: Lighter weight. Low overall height. Longer feed. Positive dust-collection. Fast drilling speed.

Test the S-20 in your mine. See how it reduces roof-bolting costs. A demonstration can be arranged by contacting Schroeder Brothers, 3116 Penn Ave., Pittsburgh, Pa.; Acme Machinery Co., Williamson, West Virginia; Equipment Service Co., Inc., 617 North 9th St., Birmingham, Alabama. Or, you can contact us direct.

LE ROI Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationary air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

MANITOWOC 5½-yd. drag makes 80 passes each hour in tough, rocky overburden

Two 5½-yd. Manitowoc Model 4500 draglines are opening new coal mining areas for the Dodds Coal Co., New Galilee, Pa. Both of the drags operate 20 hours at a stretch, with one unit averaging 80 passes per hour of hard-to-handle overburden. Approximately 8800 cu. yds. are moved each day by this machine, pictured above working a cut 100′ wide and 70′ deep and equipped with a 120′ boom.

The Manitowoc units have the capacity, flexibility and range to consistently produce big output at a profit for the Dodds Co. Since the Model 4500's have a single diesel power package they are not restricted by trailing electrical cables and the need to work close to power installations. Simple design — no complicated electrical motors, switches or miles of wiring — has kept the big draglines working constantly with little downtime for maintenance. All lubrication can be handled from the inside with the exception of the fairlead and seven fittings. And these are greased in minutes, usually during a shift change.

The Dodds Company's Manitowocs were set up in only three days, compared to weeks of set-up time required by other rigs of this capacity. And on-the-job mobility is superior, too, with speed and ease of handling equal to a crawler tractor.

Repeat orders from every coal mining area are proof of Model 4500 performance. Ask your Manitowoc distributor for complete literature and specifications.

MANITOWOC ENGINEERING CORP. MANITOWOC, WIS.

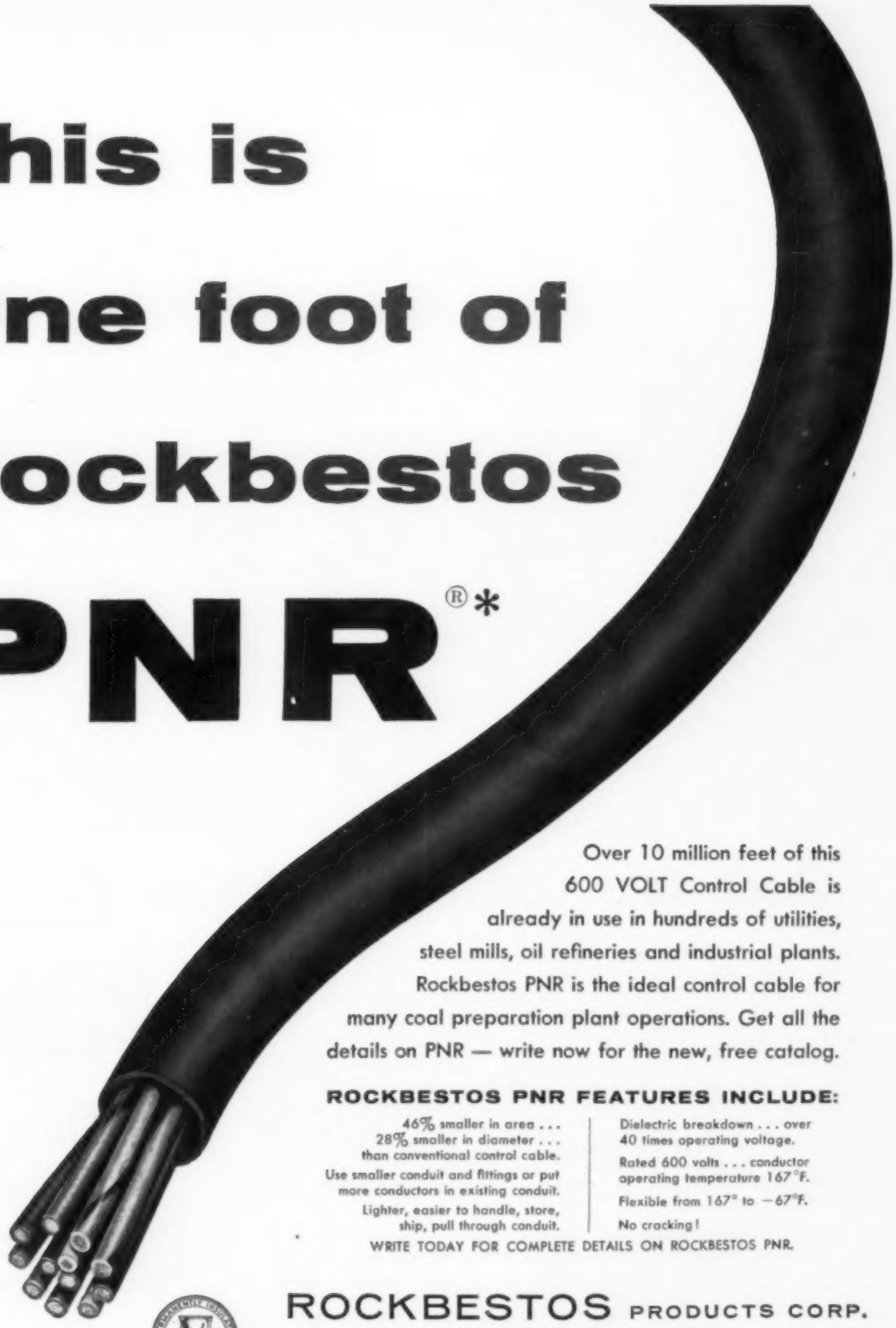
SHOVELS 1-5½ yds.

Manitowoc

CRANES 20-100 tons

REMOVING BOULDERS UP TO 15 TONS APIECE, a second Manitowoc Model 4500 owned by the Dodds Coal Co. works a 200′ wide cut. Skillful handling of the drag enables the huge boulders to be moved with comparative ease. The amount of blasting usually required for removing rough overburden like this is greatly reduced.

This is One foot of Rockbestos PNR®*



Over 10 million feet of this 600 VOLT Control Cable is already in use in hundreds of utilities, steel mills, oil refineries and industrial plants. Rockbestos PNR is the ideal control cable for many coal preparation plant operations. Get all the details on PNR — write now for the new, free catalog.

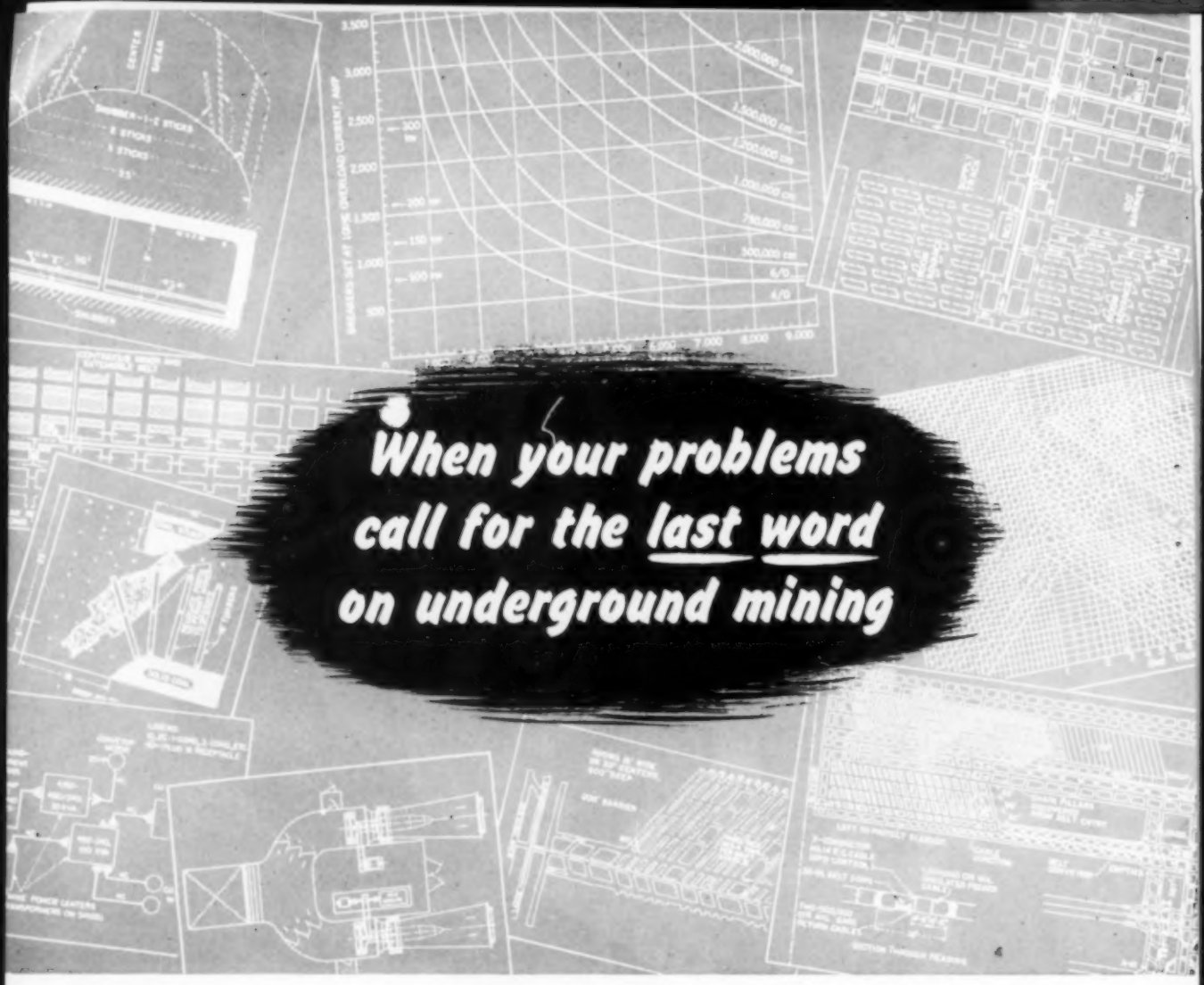
ROCKBESTOS PNR FEATURES INCLUDE:

- 46% smaller in area . . . 28% smaller in diameter . . . than conventional control cable.
- Use smaller conduit and fittings or put more conductors in existing conduit.
- Lighter, easier to handle, store, ship, pull through conduit.
- Dielectric breakdown . . . over 40 times operating voltage.
- Rated 600 volts . . . conductor operating temperature 167°F.
- Flexible from 167° to −67°F.
- No cracking!

WRITE TODAY FOR COMPLETE DETAILS ON ROCKBESTOS PNR.

ROCKBESTOS PRODUCTS CORP.
NEW HAVEN 4, CONNECTICUT
NEW YORK • CLEVELAND • CHICAGO • PITTSBURGH • LOS ANGELES • DETROIT
ST. LOUIS • ATLANTA • DALLAS • OAKLAND • SEATTLE

*P — polyethylene, N — nylon, R — Rockhide (PVC)



When your problems call for the last word on underground mining

Check Your Coal Age Guidebook *First*

Packed between the covers of the annual Mid-July Mining Guidebook is a 247-page practical working manual covering all phases of mine operation—the only complete, single-volume reference guide to present-day mining methods and equipment available anywhere.

The 81-page Deep-Mining Guidebook—just one of the seven editorial sections—offers you a fast-reading analysis of efficient mining practice, tied in with operating experience and results gathered from hundreds of successful mines and highlights of the new and significant trends important to you. Other sections brief you on auxiliary services, such as preparation, maintenance, supply handling and safety. You'll find the entire Guidebook a thoroughly indexed, easy-to-use reference tool to help you develop new ideas and a fresh slant on operating problems.

For speedy reference to equipment, materials or services meeting your particular needs, turn to the 63-page Buying Directory listing all known manufacturers of over 1,100 products used in coal mining. Completely revised and up-dated for the 1957 issue, this comprehensive guide is supplemented by detailed product information in manufacturers' advertising and the location of your nearest source of supply in the list of sales offices and distributors.

DEEP MINING • STRIPPING • PREPARATION • MAINTENANCE • SUPPLIES • SAFETY • TRAINING • OPERATION STANDARDS • BUYING DIRECTORY

An Annual Coal Age Subscriber Service— Used Daily by Progressive Mine Management

Never before has Chevy been so right for strip mining and quarry work!

Here's a truck specially designed to take to your kind of work like a duck takes to water! It's Chevrolet for '58 with new hustle, muscle and style that mean money in your pocket!

As you can see, Chevy's a honey of a truck this year, and that handsome, broad-shouldered '58 appearance only hints at the host of new and improved features that are ready to put you dollars ahead in the years to come. *Here's a truck ideally suited for haulers in your line of work.* Here's new styling to help build your business prestige every day in the week. And what workers these new heavyweights are! There's new power to whip mammoth hauls from the industry's newest engine, the 230-h.p. Workmaster V8* with revolutionary Wedge-Head design . . . or from the durable 175-h.p. heavy-duty Super Taskmaster V8 in Series 70 and 80 models. G.V.W.'s go all the way up to 36,000 lbs. (with Triple-Torque tandem) for big, profitable payloads. And these trucks come equipped with the toughest of big truck chassis components, either as standard equipment or as extra-cost options: cast spoke or disc wheels, air-hydraulic brakes, full-air brakes or big Hydrovac power brakes, and smooth Synchro-Mesh transmissions built to meet your needs precisely.

There are many such reasons why Chevy's never been *so right* for your work—many more reasons why you'll want to see your Chevrolet dealer soon! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

**Featured in Series 90 and 100.*

CHEVROLET

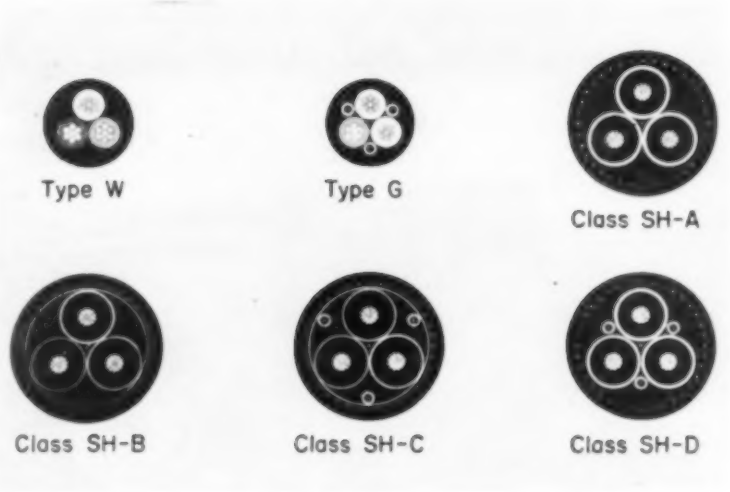
NEW CHEVROLET TASK·FORCE 58 TRUCKS

Cables . . .

Development and application limitations

Most frequent causes of failure in service

Better maintenance for longer life



THREE TYPES OF PORTABLE CABLE for strip mining provide, with modifications, six separate constructions to meet varying conditions.

Portable Cables For Surface Mining

By Stephen Bunish
In Charge of Development, Portable and Mining Cables, Anaconda Wire & Cable Co., Marion (Ind.) Mill.

SURFACE MINING with large electric shovels began in the early 1920s. During the past 30 yr equipment manufacturers and mining operators have brought about many innovations in shovel design. This progress in strip mining has been paralleled by a consistent development of better cables.

During most of the 1920s portable cables for shovels were relatively small in size, mostly ranging from No. 8 through No. 2 AWG. The insulations were natural rubber. The protective coverings consisted of asphalt-impregnated cotton braid or a spiral wire armor.

The 1930s saw greater emphasis placed on developing cables especially for shovels in open-pit mining. Conductor sizes increased. Rubber chemists improved the high-voltage characteristics of insulations. Electrostatic shielding and grounding conductors were incorporated to achieve maximum safety during handling. Natural-rubber jackets with physical characteristics of tire treads were used as protective sheaths. Chemical anti-oxidants and sunproofing materials were added to rubber compounds to insure long life. Shovel cables became tougher and more flexible.

The 1940s ushered in the era of synthetic rubber. Accelerated research programs aimed at finding a substitute for natural rubber produced polymers that were tailor-made for mining cables. Neoprene, with its inherent resistance to weathering, oil and flame, received general acceptance as a protective sheath for portable cables. The excellent characteristics of butyl rubber as a high-voltage rubber insulation were recognized. Butyl insulations began to become a part of mining cable constructions.

Cable research continues at an accelerated pace in the present decade. Shovel cables are getting larger in size. Circular-mil sizes are not uncommon. Voltages are rising. The physical and chemical environments of stripping operations demand more and more of portable cables. These demands are being met by a continuous improvement in the components that make up a cable. Insulations have been developed with excellent resistance to ozone, moisture and heat. Temperature ratings of insulations have increased, resulting in greater current-carrying capacities. Cable jackets have been made tougher. Complementing the improvements in materials are refinements in manufacturing process, statistical quality control and rigid inspection.

Needed Cable Characteristics

A portable cable for open-pit equipment must provide the following:

1. Adequate electrical properties for the chosen circuit voltage.
2. Flexibility.
3. Safety in handling.
4. Physical toughness.
5. Resistance to weathering and the chemical environment of stripping.

Three portable cable constructions presently are used extensively with strip-mining equipment: Types W, G and SH. SH cable is available in four classes: A, B, C and D. This variety offers considerable latitude in the proper selection of cables consistent with voltage, shielding and grounding requirements.

Long service life and good cable maintenance are greatly enhanced by recognition of the limitations of shovel-cable construction. A cable, like any other piece of equipment in a stripping operation, has certain limits within which it will operate troublefree. When these limits are exceeded cable damage, or failure, follows.

The three basic components of all portable cables are:

1. The copper conductors.
2. Conductor insulations.
3. A protective sheath or jacket over the cable as a whole. Each has a function, as follows:

Conductor—Carries current from power source to equipment.

Insulation—Confines current within the conductor.

Jacket—Acts as sheath or covering to protect the insulation and conductor.

Injury to any one of these components means a potential cable failure.

Basic in Maintenance

The first step in initiating a maintenance program to extend cable service life and to minimize outages is to obtain realistic data on the causes of cable failures. For this purpose a survey has been made of open-pit mining operations throughout the United States. Mine operators have been most generous and cooperative in supplying information.

The survey showed a wide diversity in the operating voltages used in open-pit mines throughout the country. These range from 440 through 7,200.

The majority of operations use over 2,000 V. Cable preference for mines under 2,000 V is Type W or Type G. Eighty-six percent of the mines using over 2,000 V preferred Type SH-D cable.

The function of a trailing cable is to supply a continuous flow of current between a stationary power source and mobile equipment. Any interruption of this current flow, due to a cable failure, automatically renders the equipment useless. The extent of the loss will depend on the type and size of equipment, production schedule, type of material being mined and length of time necessary to get back into production.

To obtain realistic data on the factors which most often cause cable failures, operators were asked the following questions:

1. What unusual operating conditions are present that could directly or indirectly affect cable life?

2. What causes most of the cable failures or damage?

An analysis of the answers pointed up the following:

1. The causes of cable failures, in general, are similar in all operations.

2. The location and the type of mineral create unique situations that effect cable life and service.

3. The various causes of cable failures can be classified and these data used as a guide for cable maintenance.

Why Cables Fail

The following summarizes unusual mining conditions and reflects those areas of application where cables are subjected to the type of abuse that exceeds the working limits inherent in their construction. It is under these conditions that cables must be given special consideration in a maintenance program:

1. Excessive traffic, such as, tractors, trucks and bulldozers, in the vicinity of the cable.

2. Continuous operation 24 hr per day 7 days per week.

3. Long equipment moves.

4. Dragging cables up and down highwalls.

5. Deep overburden resulting in a narrow pit, thus increasing damage from rock falls or slides.

6. Failure to move cables into the clear during blasting.

7. Sharp rock.

8. Extreme heat (100F ambient in the sun).

9. Extreme cold (−40 to −45F).

10. Continuous movement through uncleared areas.

11. Operating cables in water and ice.

12. Moving cables with trucks or tractors.

Analysis of the most prevalent causes for cable failures in the industry indicated a repetition of causes common to all operations. These data also suggested a classification for these failures and the frequency with which they occurred. The following table summarizes these data:

Causes of Shovel-Cable Failure

	Frequency, Per Cent
Rock falls and slides	27.2
Runovers by pit equipment	22.7
Dragging while moving equipment	12.1
Splice and previous damage	7.5
Excessive tension—pulling apart	6.0
Severe bending	4.5
Cable design—faulty components	3.0
Miscellaneous	17.0

This pattern will naturally vary because of the diversity in open-pit mining. It is primarily intended to sketch, briefly, causes for cable failures throughout the industry as a whole. A report from a typical individual operation is offered for comparison:

Cause	Frequency, Percent
Falling rocks	30
Runovers by dragline and bulldozers	30
Tension	10
Splices	10
Miscellaneous	20

It is axiomatic that portable cables seldom wear out. They usually are damaged beyond repair. How long did the cable last? The answer to this question is an excellent criterion for evaluating the effectiveness of a cable-maintenance program. The shovel cable "life expectancy" throughout the industry ranges from about 4 to 15 yr, with an overall average of 8.7 yr. Unusual operating conditions—for instance, high ambient temperatures in hot climate—partially account for the wide range in expected cable life.

Effective Cable Maintenance

It is evident that when a cable fault occurs one highly specialized piece of equipment is out of production. This loss, in varying degree, is felt throughout the operation. The best means of insuring a continuous flow of current to a mining machine is a workable cable-maintenance program. This program should not be limited to a few "Dos" and "Don'ts," but must consist of a series of good cable practices that become a habit and fit naturally into the daily mining routine. There is no magic formula for cable maintenance that fits all mining conditions. The following basic outline suggests an approach that can be applied at any operation:

1. **Choose a cable design** that is consistent with voltage and safety requirements.

2. **Maintain a record** of causes of cable failures.

3. **Educate operating personnel** to recognize the limitations of a portable cable.

4. **Take remedial action** based on records and education. Records will point up what made the cable fail. Education will help explain why the cable failed.

Effective maintenance begins with choosing the most suitable cable construction obtainable for the application. Economic considerations alone are a poor substitute for sound engineering. Cable manufacturers supply an abundance of data to serve

This 14-cu. yd. medium-duty Bucyrus-Erie bucket is on the 215-ft. boom of the 650-B at the right, stripping approximately 50 feet of overburden to uncover a 6-ft. vein of coal.

Compare Bucyrus-Erie Buckets With Any Others...

On Output

Watch a new-design Bucyrus-Erie dragline bucket work, and see for yourself how it out-performs. Note how the "slicing action" lip quickly penetrates even toughest materials, how the tapered basket fills fast and full. See how the bucket carries smoothly and cleanly because of its correct flaring and balance — dumps fast because of "clean" interior design and high arch.

Compare the loads carried, the passes every hour — and you'll understand why it's hard to beat a Bucyrus-Erie bucket for day-after-day output.

On Economy and Long Life

Ask owners about the over-all economy, the maintenance and service life of new Bucyrus-Erie buckets. You will find that the BECOLOY from which they are made gives them not only light weight but great strength — adds wearing ability and impact resistance. This is reflected in the way they stay *on* the job and *out* of the shop — and the way they last. Such low maintenance and long life, plus high output, add up to real over-all economy!

Ask your Bucyrus-Erie distributor for complete information on these outstanding buckets, available in three types to fit your needs — light, medium and heavy duty, solid or perforated.

34857

Compare Buckets and You'll Buy Bucyrus-Erie!

A Familiar Sign . . . BUCYRUS ERIE *. . . at Scenes of Progress*

BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN

as a guide in making a proper choice. The following should be emphasized in choosing a cable type and size:

1. **Current-carrying capacity.**
2. **Voltage drop.**
3. **Ambient temperature**—for example, extreme summer heat.
4. **Mechanical strength.**
5. **Safety.**
6. **Unusual conditions** that might require a special cable construction.

Special consideration should be given to the recommendation of the IPCEA that "where maximum safety is desired, Type SH-D cables are recommended for circuit voltages over 2,000 V."

The second step in a good maintenance program is analysis of performance. An accurate record must be maintained and should include:

1. The date of installation.
2. Record of removal for repairs.
3. The cause of each failure.

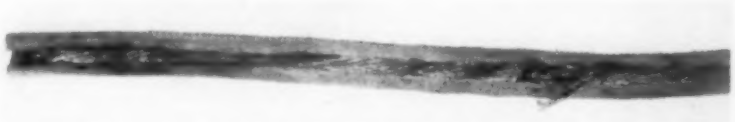
Information on No. 3 is the most important of all.

An accurate record of causes of failure will point out those areas where maintenance is most urgently needed. This record will also indicate the effectiveness of any remedial action that might be taken. Experience is a good teacher and can be most useful in setting up a program, but experience can be greatly enhanced by an accurate record. There is too much tendency to classify practically every failure under "poor handling by operating personnel."

Portable cables are of sufficient importance to the mining industry to justify considerable research on the part of cable manufacturers. This research is continuous and every effort is made to put together that combination of materials which will offer the maximum in physical toughness, electrical characteristics and safety to operating personnel. Although there have been phenomenal advances in the field of chemistry and metallurgy, there is a limited number of raw materials that can meet the rigid requirements of the cable industry. To date, copper is the most practical metal to use as a flexible power conductor. Aluminum shows considerable promise but is still in the experimental stage. Thermosetting rubber compounds make the best insulations and protective sheaths, or jackets.

A mutual understanding between the cable manufacturer and mining operator concerning the physical and electrical limitations of a cable is essential. Such an understanding will prove to be one of the most rewarding steps in the entire program. Cable manufacturers can offer valuable assistance in training programs designed to instruct operating personnel in good cable practice.

HOW CONCENTRATION OF IMPACT and concentration of conductors affect cable's ability to withstand rock falls in open pit mining.



SEVERE BENDING disturbs balance and results in wire breakage and failure.

Rock Falls and Runovers

The countrywide survey showed that falling rock and runovers are responsible for approximately 50% of all cable failures. A few individual operations quoted figures of over 75%. It is in this area that a concentrated maintenance effort is required. Cables subjected to rock falls and runovers by heavy equipment are damaged by impact, cutting and crushing.

Shovel cables have, on occasion, exhibited spectacular resistance to mechanical damage, but to a large degree their ability to withstand impact and crushing is limited by the following:

1. **The concentration of impact** on a small area of cable. A rock striking the jacket surface sharp edge first can eventually do more harm than a larger rock landing flat side down.
2. **The position of the conductors** at the point of impingement. The most vulnerable is when one conductor rests directly over another. The metal conductors serve as blunt cutting edges and under severe impact will initiate breaks or ruptures in the insulation.
3. **The physical characteristics of the jacket and insulation.** Relatively speaking, jackets have the properties found in tire treads. High-voltage insulations are approximately one-half to two-thirds as tough as the jackets.
4. **Flexible shields and grounding conductors** are of necessity constructed with small-diameter wires. When subjected to impact or crushing they are readily deformed and easily broken—for example, an individual shielding wire has a breaking strength of approximately 6 lb.

Damages to cable components by rock falls and runovers are all potential blowout points. Cuts in jackets provide entrances for water to penetrate the cable. Deformed or injured copper wires accelerate fatigue breaks. Insulation with compression breaks will rupture electrically.

Averting Physical Damage

Maintenance suggestions that bear repetition are:

1. **Move cables into the clear** during blasting.
2. **Position cables in the pit** where there is the least possibility of their getting hit by rock slides from the spoilbank or highwall.
3. **Provide vehicles and areas of heavy traffic** with adequate lighting during night-time operation. Cables

long-run power by Allis-Chalmers

If you specify "Allis-Chalmers motors or equal"

. . . remember that the "equal" is possible only in two respects: price and nameplate specifications. You can't match the *long-run power* of Allis-Chalmers motors.

Double-shielded bearings guarded against dirt and over-greasing . . . provision for elimination of moisture condensation . . . practically indestructible rotor design . . . more cooling surface . . . more iron and copper content — these are the features (with others) that make up long-run power. These are the features that give Allis-Chalmers motors "plus" performance that can't be equalled.

Find out more about the motors with long-run power from your A-C representative or distributor, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5663

should be kept visible at all times.

4. **Either bury cables or provide arched runways** at cable crossings.

Approximately 12% of the reported causes for cable failure resulted from dragging cable up and down highwalls or during moves of equipment. Many times these moves are through uncleared terrain. Cable jackets are subjected to abrasion, cutting by sharp rocks, excessive tension and severe bending.

The long cable service life obtained by most operators confirms that cable jackets offer excellent protection against the normal abuse inherent in open-pit mining. The tension imposed upon cable jackets during dragging seriously affects their resistance to abrasion and cutting. Wear and tearing are accelerated. Failures attributed to dragging could be reduced by providing a sled or similar arrangement for transporting cables.

Cable limitations described thus far are related chiefly to the ability of rubber-like components to withstand physical abuse. Tension and severe bending are two use conditions which critically affect the inner components of cables, including the insulated power conductors, shielding and grounding conductors. Excessive tension and severe bending are responsible for about 10% of all cable faults.

Flexible annealed copper conductors are not steel ropes! A high-tensile steel rope of the type used in open-pit mining has approximately five times the breaking strength of an equivalent-diameter annealed-copper conductor. The most obvious result of excessive tension is pulling a cable in two. Less evident results (but potentially as damaging) are the following:

1. **Loss in cable balance**—wire breakage due to bending or flexing is accelerated.

2. **Unequal tension on the conductors**—causing the cable to kink.

3. **Vulnerability to compression cutting,** abrasion and other physical damage.

A suggested remedy is to limit the maximum working stress on a cable to 12% of the total breaking strength of the conductors. This gives a safety margin of around 8 to 1.

The following illustrates the maximum working stress of several popular sizes of shovel cables:

Size, AWG	Approximate Breaking Strength, Lb	Maximum Working Stress, Lb
6	2,200	264
4	3,600	432
2	5,500	660
1/0	8,900	1,068
3/0	14,000	1,680

Cable flexibility and resistance to wire breakage are achieved with precision stranding and cabling. The length and direction of lay in the inner construction of a cable are critical. Severe bending disturbs the balance of a cable design and . . .

1. **Accelerates wire breakage.**

2. **Causes kinking** which in turn damages individual wires.

3. **Prevents cable components from bending on a common axis.** They have little chance to move or slide and thus dissipate the energy of the bend.

Multiple-conductor cables rated at 5,000 V and under should not be bent sharper than 12 times their outside diameter. Popular sizes of shovel cables and recommended bending diameters are:

Size, AWG	Nominal Cable Diameter, In	Minimum Bending Diameter, In
6	1.76	21
4	1.88	23
2	2.06	25
1/0	2.28	26
3/0	2.56	31

Fitting a cable around a grooved semicircular jig similar to a tire rim would aid in cutting down faults resulting from severe bending while moving.

Cable Splicing

Worn-out splices and previous physical damage account for about 7% of all cable failures. Eighty-seven percent of the operations in this survey make temporary splices. Thirteen percent immediately make a permanent vulcanized splice, or replace with a spare cable.

Temporary splicing techniques vary. Conductors are joined chiefly with compression or soldered sleeves. Insulations are rubber tapes, cambric or micarta. Protective coverings are friction or rubber tapes. Splices are waterproofed with Glyptol or Rubberoid paint. Seventy-eight percent of the operations make a vulcanized splice.

Schedules for making permanent repairs vary.

The following are examples of current practices:

1. **Damaged cable is replaced immediately** with a spare; permanent repairs are made in the shop.

2. **Permanent repairs are made** the first available down day.

3. **Cables are removed for permanent repairs** after 3 to 5 temporary splices have been made.

The time required to make splices ranges from 30 min to 6 hr, the average being about 2 hr. Seventy-eight percent of the mines surveyed use tests other than line voltage to check repairs. Some examples are:

1. **Meggering.**

2. **Hi-pot tests.**

3. **Application of 10 to 15 kv** for 2 or 3 min.

Seventeen percent of the reported causes for failures were ascribed to miscellaneous types of abuse. In general, they are a combination of causes already discussed. One notable exception is damage resulting from electrical overload. Cable conductors are given temperature ratings consistent with the ability of the insulation to withstand elevated temperatures. When this temperature is exceeded deterioration of the rubber components results. In extreme cases protective sheaths will become brittle and crack. Conditions which accelerate damage due to overload are:

1. **Conductor size too small** for the application.

2. **Layering cables on reels,** or limited ventilation in vicinity of excess cable.

3. **High ambient temperatures** which derate the current-carrying capacity of the cable.

The most effective maintenance procedure where electrical overload is a problem is the use of larger sizes of copper conductors, and adequate ventilation in areas where excess cable is stored.

The following opinion is expressed to conclude this discussion. If the ingenuity so amply demonstrated by the surface-mining industry was extended to include cable maintenance, cable faults could be kept at a minimum. This would result in more efficient use of equipment and longer cable life.

ORIGINAL BIT WITH ENCLOSED TIP!

WHY CARBOLOY® CCS-2 BITS STOP TIP

"Phantom" view of Carboloy CCS-2 shows how the cylindrical tip is completely enclosed in steel to prevent tip loss and breakage.

AUTHORIZED CARBOLOY MINING TOOL DISTRIBUTORS

Complete Service Through Factory and Distributor Assistance

ALABAMA
BIRMINGHAM 2
Shook & Fletcher Supply Company

COLORADO
DENVER
The Mine & Smelter Supply Co.

ILLINOIS
MT. VERNON
Pickard Industries, Inc.
Central Mine Supply Div.

INDIANA
TERRE HAUTE
The Mine Supply Co., Inc.

KENTUCKY
HARLAN
Kentucky Mine Supply Co., Inc.
LOTHAIR
Speck-Cornett, Distributor, Inc.
MADISONVILLE
Pickard Industries, Inc.
Central Mine Supply Div.
PAINTSVILLE
Farmers Supply Company
PIKEVILLE
Big Sandy Electric & Supply Co.

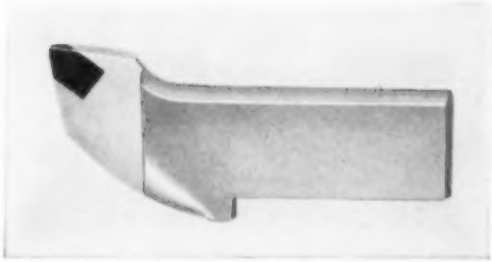
NEW YORK
BUFFALO 23
Austin Ford Logan, Inc.

OHIO
CAMBRIDGE
Cambridge Machine & Supply Co., Inc.

LOSS . . . MINE MORE COAL PER SHIFT

1 Carbide tip is enclosed in steel to stand more abuse

On the Carboloy CCS-2, a solid cylinder of carbide is enclosed in steel . . . and held in place by a combination of braze and mechanical holding. The carbide stays firmly in place, even in the toughest formations. So, the CCS-2 stays on the job longer, under conditions that quickly ruin bits of other design.



Cutaway of CCS-2 shows extra-long cylinder of carbide. Insert is brazed all around, and also held mechanically in place.

2 Shank and tip design cuts downtime, increases tonnage

On the CCS-2, the tip is positioned at the best angle to withstand cutting forces and make best use of the carbide's high compressive strength. The flare of steel behind the tip gives added protection against breakout. Result: less downtime for bit changes . . . more production per tool at lowest cost per ton.

Top view of CCS-2 shows how steel is flared behind carbide insert. This gives the double-held tip added protection against breakout.

The CCS-2 is the most widely accepted mining bit in the industry. Like all bits in the complete line of Carboloy Mining Tools, it is stocked by your local Authorized Carboloy Mining Tool Distributor. For more information, or in-mine assistance, call him today (his name is listed below). Or write: *Metallurgical Products Department of General Electric Company, 11120 E. 8 Mile Ave., Detroit 32, Michigan.*

CARBOLOY QUALITY CONTROL LABORATORY

. . . key to consistent carbide performance

This $20,000 X-ray fluorescence unit is part of the quarter-million-dollar equipment investment in the Carboloy Quality Control Laboratory. The Laboratory makes sure all Carboloy carbide inserts are metallurgically perfect. Result: consistent top performance from every Carboloy Mining Tool you buy.

CARBOLOY®
CEMENTED CARBIDES
GENERAL ELECTRIC

STEUBENVILLE
The Vato Manufacturers Sales Company, Inc.

OREGON
PORTLAND 4
J. E. Haseltine & Co.

PENNSYLVANIA
BELLE VERNON
Lee Supply Co.
L & S Bit Service
PITTSBURGH 12
General Electric Supply Company

WASHINGTON
Fairmont Supply Company

TENNESSEE
KNOXVILLE
Crowell Engineering Co.
W. J. Savage Co.

TEXAS
EL PASO
The Mine & Smelter Supply Co.

UTAH
SALT LAKE CITY
The Mine & Smelter Supply Co.

VIRGINIA
ANDOVER
Central Supply Co. of Virginia, Inc.
McCLURE
Erwin Supply & Hardware Co., Inc.

WEST VIRGINIA
BLUEFIELD
Bluefield Supply Co.
Rish Equipment Company
Fairmont Supply Company

CHARLESTON
Rish Equipment Company
CLARKSBURG
Rish Equipment Company
FAIRMONT
Fairmont Supply Company
MONTGOMERY
Marathon Coal Bit Co., Inc.
RAVENSWOOD
Fairmont Supply Company
SHINNSTON
Erwin Supply Co., Inc.

IN THICK COAL (left) and thin (right) new equipment developments save by facilitating . . .

Ripping Coal for Loading

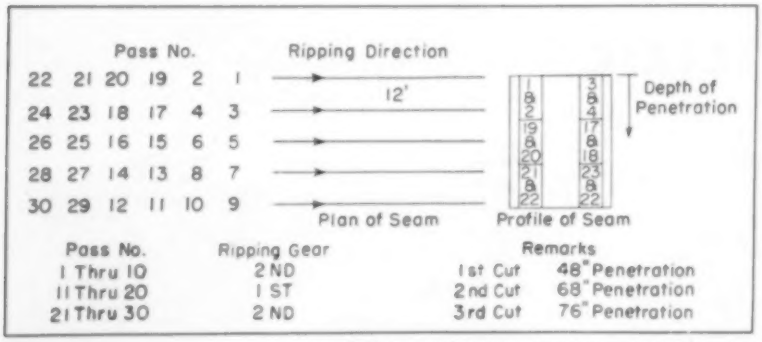
Tractor-mounted single-toothed rippers can break coal full depth with substantial savings compared to shooting or pinning.

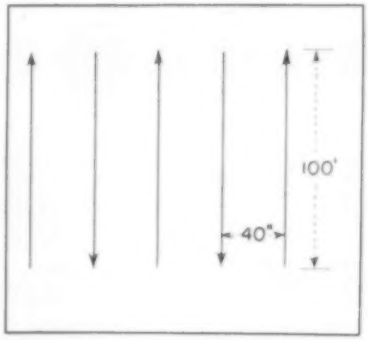
By Raymond F. Mueller
Mining Representative, Caterpillar Tractor Co., Peoria, Ill.

A NEW CONCEPT in open-pit mining—breaking coal seams with a tractor-mounted ripper—is proving an effective and economical aid in keeping production costs to a minimum. Pits in Illinois, Pennsylvania, Kentucky and Missouri, where the new technique has been given thorough testing, have realized definite benefits over ordinary methods of breaking the seam. Rippers mounted on crawler tractors have shown more versatility, more production per hour and less cost.

Ripping as a production technique was made possible by the recent development of large hydraulically-controlled rippers mounted on the rear of tractors in the over-300-hp class developed over the last few years. The combination of these two machines permits the ripper to utilize the tractor's weight and power. Unlike former towed rippers which simply trailed the prime mover and exerted no down pressure, the tooth on the mounted ripper concentrates the entire weight of the tractor for maximum penetration. With tractor weights approaching 70,000 lb, only the tractive effort of the prime mover and the size of the tooth limit the depth of penetration. Ability of the modern crawler to develop up to 54,000 lb of pull at the drawbar makes ripping possible in seams up to 6 ft thick.

Complete fracturing of the seam can be obtained with the new technique. During the passage of the tooth through the seam the coal is not only broken at the point of the tooth's passage but lateral fractures, caused by the lifting action of the tooth, spread to the area between furrows. Like the cracks spreading through a piece of glass from where


Pass No.
Ripping Direction
22 21 20 19 2 1
24 23 18 17 4 3
26 25 16 15 6 5
28 27 14 13 8 7
30 29 12 11 10 9
12'
Plan of Seam
Depth of Penetration
Profile of Seam
Pass No. Ripping Gear
1 Thru 10 2 ND
11 Thru 20 1 ST
21 Thru 30 2 ND
Remarks
1st Cut 48" Penetration
2nd Cut 68" Penetration
3rd Cut 76" Penetration



RIPPING PROCEDURE in thick coal (left) and thin (right).

COAL-BREAKING TOOL—8-ft ripper tooth before and after insertion for pass through coal seam.

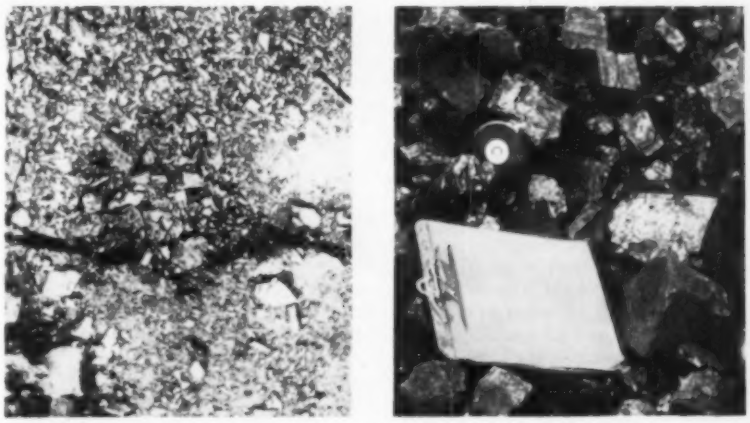
a stone strikes, the fractures cause the entire section of coal between furrows to break up.

Ripping Patterns

Proper results in ripping depend on the establishment of a pattern to fit the needs of the particular mine. As each seam presents a unique set of specifications, no pat formula can be arranged and each system must be developed by trial.

Using the procedure for thick coal shown in an accompanying diagram, a Kentucky mine saves $27,000 a year by ripping a 6.3-ft seam. The block measures 90 ft wide and 200 ft long. It takes 69.64 min for one tractor to break the coal, resulting in a production of 3,610 tons per hour based on a 60-min hour. After the tractor completes the ripping assignment, it joins two other 300-hp tractors in stripping overburden. The three machines handle 60% of the overburden moved at the mine.

This added versatility for the seam-breaking machine pays off in reduced costs for the mine operator. One machine and one man can handle a variety of jobs and it is not necessary to have expensive equipment standing idle during other operations. Other benefits result. In pits where no blasting is done, the ripper, built to withstand heavy shocks encountered during operation, cuts shovel stresses and reduces maintenance compared to loading off the solid. Such shock reduction can result in longer life for high-cost shovel components. In addition, breaking the seam increases the overall loading efficiency. One factor is reduction of voids. Another is less loading time per haul unit, giving increased haulage efficiency.



RIPPING RESULTS—fracturing between furrows thoroughly breaks the coal (left) and results in a high yield of coarse sizes.

Even though the tractor-mounted ripper does save money over other methods by its versatility, the biggest economy is in actual production work. In pits where the technique was tested, results have shown amazing cost and work reduction per ton.

Cost Reduction

In a Fulton County (Illinois) mine, a tractor-mounted ripper with an 8-ft tooth broke a 4½-ft seam of No. 5 coal. Average production was 2,322 tons of raw coal per hour. Approximate costs of the ripper operation were $136 per 8-hr day. Opposed to this was a cost of $345 per day, including equipment, supplies and labor. Tractor-ripper costs were based on depreciation, fuel, lubrication, estimated repairs and labor. In this case, use of the ripper resulted in a daily saving of $209 and a yearly (203 days) saving of $42,000.

In this pit, the tractor ripped a block of coal 330 ft long, 45 ft wide and 4.5 ft deep in 47 min, including all delays. The block contained 2,845 tons. Ripping on 4-ft centers in two passes, the tooth reached down 37 in on the first pass. On the second pass, the tooth reached 55 in to the

how to make your own

mine roof jacks

1. Duff-Norton supplies the head and handle.
2. You supply the pipe to fit your desired height.
3. Add the desired Duff-Norton base and you have the perfect mine roof jack.

Here's all you do—(1) cut any 2-inch standard steel pipe into lengths desired and (2) attach safe, strong, dependable Duff-Norton head, handle and base fittings. That's all!

You choose the type of heads, handles and bases best suited to your particular needs. They are available in a variety of types in both 8 and 16-ton capacities (16 ton requires 2-inch *extra strength* pipe). All fittings are painted light grey for better visibility.

For complete information on Duff-Norton mine jacks, see your local distributor or write the world's oldest and largest manufacturer of lifting jacks for your free copy of catalog AD-10J, "A Handy Guide for Selecting Duff-Norton Mine Jacks." This catalog contains complete information not only on mine roof jacks but other popular Duff-Norton jacks for useful trouble-free service in and around coal mines.

DUFF-NORTON COMPANY

P. O. Box 1889 • Pittsburgh 30, Pennsylvania

COFFING HOIST DIVISION • Danville, Illinois

DUFF-NORTON JACKS
Ratchet, Screw,
Hydraulic, Worm Gear

DUFF-NORTON

COFFING HOISTS
Ratchet Lever
Spur Gear, Electric

Ripping Coal *(Continued)*

fireclay below. Average speed on the first pass was 2.2 mph; second pass, 1.88 mph. After completing its passes, the tractor doubled in bull-dozing and general work around the area.

At a Pennsylvania bituminous mine, a tractor mounting a ripper with a 28-in penetration worked five seams varying from 16 in to 4½ ft in depth. Rock spoil was removed with regular loading shovels, requiring extra work for the big machines. With its ripper, the tractor broke the seam, making it easier for the shovels to handle. With its bulldozer blade, the tractor moved rock spoil away from the area, freeing the shovels for loading.

To uncover the seams and rip them, as well as handle other operations as needed, the tractor-ripper combination has reduced cost at the Pennsylvania mine by as much as 50%, according to the owners.

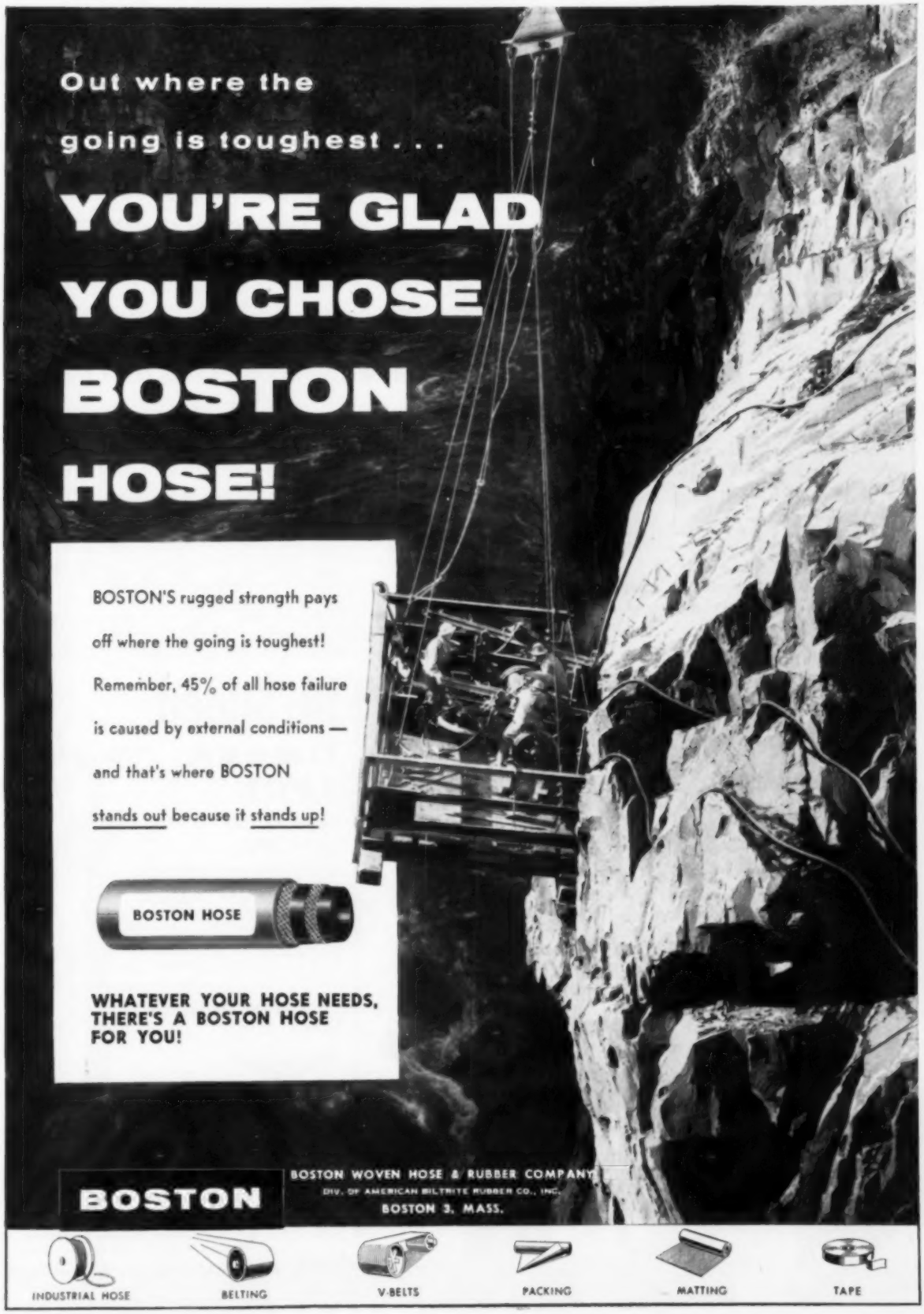
Missouri Experience

A tractor-ripper in a Missouri pit again showed definite gain for the owner. In a 30-in seam in a pit 65 to 80 ft wide, the tractor was tried as a substitute for a pinning machine. With the tooth penetrating approximately 27 in, the block was ripped on 40-in centers with the tractor in second gear. In this particular pit, the hard coal is at the top of the seam, and the tooth does not have to penetrate all the way to the bottom to achieve proper breakage.

With the pinning machine, the mine owners calculated that they were saving 4½c per ton, but the process was slow. The tractor-mounted ripper was able to break enough coal in 1½ hr to equal the production of a full 8 hr with the pinning machine. Although statistics were not available, the owners say that the ripper represents an additional economy. Dozing and general work are also handled by the tractor when it is not engaged in seam ripping.

Another mine owner says that use of the tractor-ripper technique "practically eliminated all delays at the tipple," while making an increase in production possible.

Although it is able to shatter the coal completely, the tractor-mounted ripper does not produce an excess of fines. In most instances the production ranges from less to no more.


Out where the
going is toughest . . .
YOU'RE GLAD
YOU CHOSE
BOSTON
HOSE!
BOSTON'S rugged strength pays off where the going is toughest! Remember, 45% of all hose failure is caused by external conditions — and that's where BOSTON stands out because it stands up!
BOSTON HOSE
WHATEVER YOUR HOSE NEEDS, THERE'S A BOSTON HOSE FOR YOU!
BOSTON
BOSTON WOVEN HOSE & RUBBER COMPANY
DIV. OF AMERICAN BILTRITE RUBBER CO., INC.
BOSTON 3, MASS.
INDUSTRIAL HOSE
BELTING
V-BELTS
PACKING
MATTING
TAPE

Typical Installation on Main Haulage

- Rugged.
- Low in Cost.
- Easy to Install.
- Increases Production.

"Cheatham Switch"

TRACK SWITCH THROWER ELECTRICALLY OPERATED

This modern track switch is thrown swiftly and safely by motormen as they sit in their cabs. It saves time and money, and is fool-proof and dependable!

Over 50 years experience manufacturing

ELECTRIC TRACK SWITCHES and DERAILS

Write for Catalog

CHEATHAM ELECTRIC SWITCHING DEVICE CO.
INCORPORATED
4780 Crittenden Drive, Louisville, Ky.

NUSSCO AUTOMATIC BLOCK SIGNALS FOR MINES

Save Trip Time on Main Haulage
Prevent Collisions

A two wire cable connects two or more signals together into one block. Only one signal can show proceed on the entrance of a trip, all other signals show stop.

NACHOD & UNITED STATES SIGNAL CO.
INCORPORATED
4771 Louisville Ave., Louisville, Ky.

Help in Buying . . . Who Makes It . . . Where Are They

YOU'LL FIND A COMPLETE CROSS-SECTION of the modern equipment, materials and services offered by manufacturers and service organizations is presented in your Mid-July 1957 MINING GUIDEBOOK issue of *Coal Age*.

The Buying Directory Section is designed to help you in three major ways:

1. **If you need equipment, materials and services not previously used . . .**
2. **If you are interested in additional sources of equipment, materials and services . . .**
3. **If you are developing a new idea in production, preparation and safety and want to see what's available for carrying it out . . .**

Check the Buying Directory beginning on p 289. Find the product in the alphabetical list. Under it will appear the names of the key manufacturers, with those advertising in this issue indicated by **black-faced** type.

Consult the manufacturers' advertisements in this issue for information on specific products, materials and services. To locate the local source of supply nearest you, check the list of advertisers district sales offices and distributors provided at the end of this issue.

SIMPLEX MINE JACKS

6 WAYS BETTER

- ★ Ratchet lowering lever type for speed with safety
- ★ 5-tons capacity (other models to 35 tons)
- ★ Double-lever sockets permit lifting in close quarters
- ★ Full capacity on cap *OR GROOVED* toe
- ★ Safety Speed Trigger
- ★ Ideal for re-railing, repairs, skidding

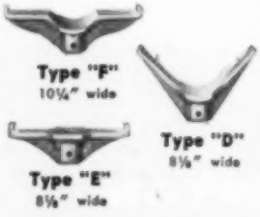
SIMPLEX JACKS

Hi-Speed TIMBER JACK

MODEL NO. 642
LIFTS 6 TONS

Combines safety of screw jack with fast action of crank. Head swivels. Five models with min. ht. from 3'6", max. ht. to 9'6".

3 TYPES OF HEADS



Write for Mines Bulletin for data on the most complete line of Mine Jacks

TEMPLETON, KENLY & COMPANY
WORLD'S LARGEST MFGRS. OF INDUSTRIAL MECHANICAL AND HYDRAULIC JACKS
2501 Gardner Road, Broadview, Illinois

CINCINNATI DUPLEX CHAIN AND BIT

The Cincinnati Duplex Chain and the Duplex Bit is recommended for maximum cutting efficiency and for use on all types of cutting machines.

"CINCINNATI MINE" *offers you* ***MORE!***

1. MORE EXPERIENCE . . . over thirty-four years of Specialization and Research in the design and manufacture of Coal Cutting Equipment.
2. MORE COMPLETE LINE of Chains, Bits and Bars for all types of CONVENTIONAL or CONTINUOUS Mining Machines.
3. MORE EXPERIENCE AND SKILL IN HEAT TREATING . . . we operate our own Heat Treating Department. This guarantees you cutting equipment made to give longer life at lower cost . . . to meet your particular cutting problem.
4. MORE EMPHASIS ON STUDYING THE NEEDS AND REQUIREMENTS, both present and future, of the coal industry. We are now designing and planning cutting equipment for use on many machines only now in the development and testing stage.
5. MORE PERSONAL PRACTICAL SERVICE through our highly trained and experienced representatives conveniently located throughout the territory.

REPRESENTATIVES AT YOUR SERVICE

FRANK ARMSTRONG
Kenilworth, Utah

CARBON TRANSFER & SUPPLY CO.
Helper, Utah

CARLSBAD SUPPLY CO.
Carlsbad, New Mexico

GORMAN'S LIMITED
Drumheller, Alberta; Edmonton, Alberta, Canada

W. M. HALES CO.
Chicago, Ill.; Danville, Ill.; Hillsboro, Ill.; Benton, Ill.; West Frankfort, Ill.; Madisonville, Ky.

HUNTINGTON SUPPLY & EQUIPMENT CO.
Huntington, W. Va.

F. G. LICENCE(PTY) LTD.
Durban, South Africa

McCOMB SUPPLY CO.
Harlan, Ky.; Jellico, Tenn.

PENN MACHINE CO.
Johnstown, Pa.; Pittsburgh, Pa.

SOCIEDAD IMPORTADORA DEL PACIFICO LTDA.
Santiago, Chile.

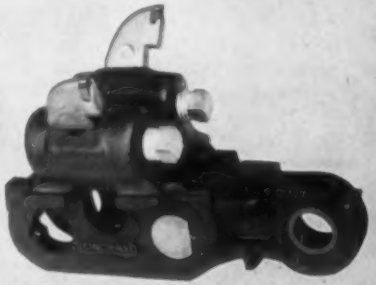
E. S. STEPHENSON & CO. LTD.
Halifax, N. S., Canada; St. John, N. B., Canada.

J. T. SUDDUTH & CO. INC.
Birmingham, Ala.

UNION SUPPLY CO.
Denver, Colo.

TYPE 185-WF . . . used on Jay Continuous Mining Machines where flanges are required . . . either the 5-chain Ripper Head or the 2-chain Rotary Head.

STANDARD KERF TRIMMING CHAIN . . . for use on the boring type Continuous Miner.

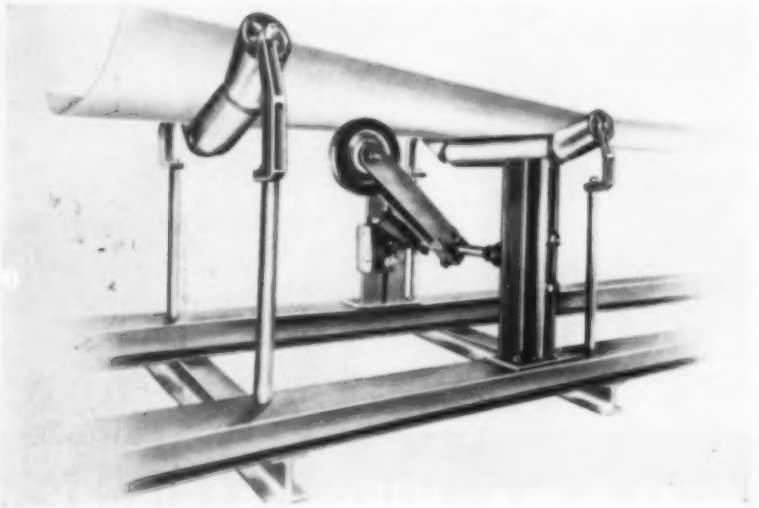


Type 185 . . . used on Jay Continuous Mining Machines where flanges are NOT required . . . either the 5-chain Ripper Head or the 2-chain Rotary Head.

the **CINCINNATI MINE MACHINERY CO.**
CINCINNATI 25, OHIO

DUSTFREE ATMOSPHERE now surrounds Lundale plant, compared to days prior to the use of sprays made more effective by chemical additive.

PROPORTIONING UNIT, automatically controlled by solenoid (see lower view), applies water and compound only as needed. Tom Merritt, Amherst mechanical engineer, checks the operation.



Tipple Dust Control

Automatically controlled spray system using chemical additive for greater effectiveness solves dust problem at cost of less than 4 mills per ton. In addition to reducing explosion and health hazards, company benefits from improved community relations.

By A. S. J. Hopkins
Vice President Engineering, Amherst Coal Co., Lundale, W. Va.

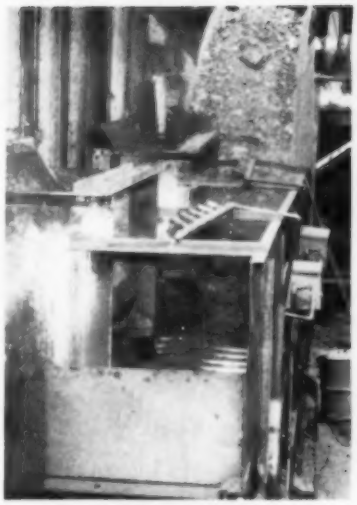
HANDLING COAL always produces dust, but when the seam produces coal that is "dry as a bone," the dust problem becomes even more acute. This was a condition we encountered at our Lundale (W. Va.) preparation plant.

Logically, the best way to get rid of dust is to keep it from getting into the air in the first place. After extensive study, we decided to fight the dust by installing a Chem-Jet wet-spray dust-control system engineered and manufactured by the Johnson-March Corp. The results were surprising. Some were obvious and anticipated, but others—just as beneficial—came to light only after the system had been put into operation.

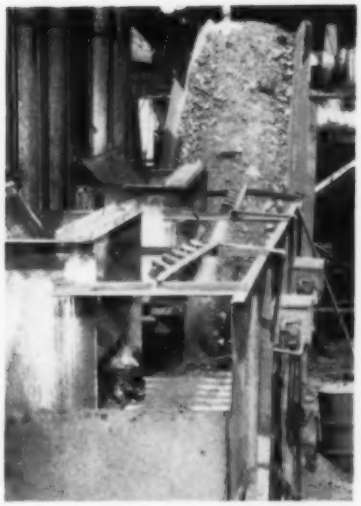
The hazard of dust explosions was immediately dispelled. In the dust-free atmosphere that safeguards their health, employees now feel better and work better—their morale and efficiency have improved. Additionally, our equipment lasts longer, as it is less subject to abrasive wear from coal-dust particles. Clean-up work also has been minimized.

Our Lundale plant processes 300 tph of very dry and dusty coal two

shifts a day five days a week. A rotary dump empties the 15-ton capacity mine cars into a 200-ton surge bin. Two reciprocating feeders feed the run-of-mine coal onto a 48-in apron conveyor that carries the coal up and discharges it onto a shaker screen where it is screened at 5 in. The 5x0 raw coal passes to a 36-in conveyor belt that carries the coal down the hill to the preparation plant. The plus 5-in raw coal from the shaker screen discharges onto a scalping table where a picker separates the coal and slate. The coal is crushed to 5 in and rejoins the shaker-screen underflow on the 36-in belt conveyor. The slate from the scalping table goes to a 30x48 Jeffrey rock crusher where it is reduced to 8 in top size. The crushed slate flows to another belt conveyor and is carried down the hill to a 600-ton slate bin.



Bin discharge—**No spray.**



Bin discharge—**Spray on.**

Before and After Dust Control

Screening—**No spray.**

Screening—**Spray on.**

Controlling Dust

The dust-control system keeps down dust by wetting the coal at those points in the handling operation where dust is created. To produce the wetting action, a specially formulated surface-active compound, known as Compound MR, is utilized. This highly concentrated chemical solution is mixed with water in small amounts and sprayed at dust-producing areas. The compound is nontoxic, noncorrosive, odorless and harmless to skin and clothing.

The combination of Compound MR and water is much more effective than plain water. Untreated water sprayed on dusty coal forms globules and rolls off, leaving the dust free to rise into the atmosphere. But application of only a minute portion of Compound MR (one part compound to 750 parts of water) breaks down the surface tension of water. The resultant solution spreads farther, penetrates deeper and diffuses more widely than ordinary water would. Water treated in this manner keeps working into the coal until it has been completely absorbed.

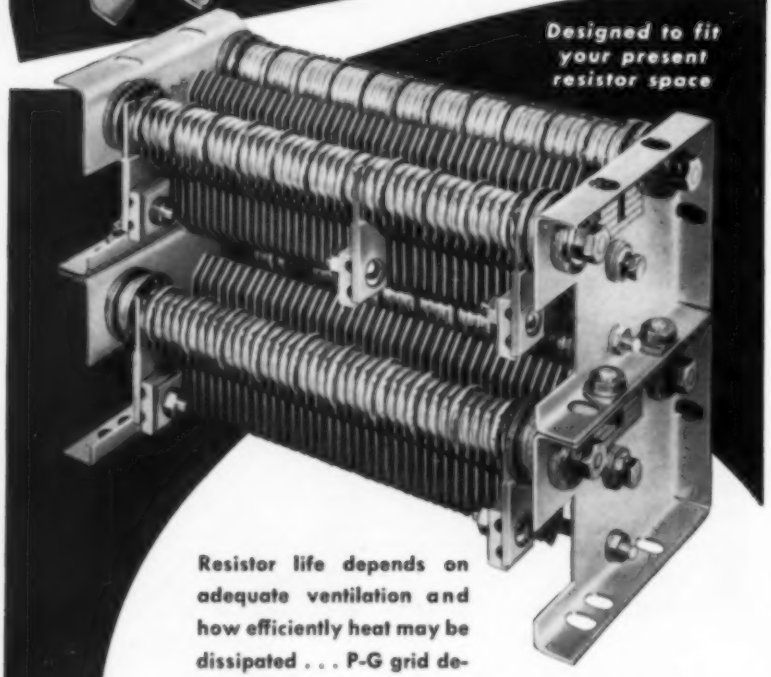
A proportioning unit meters the required amount of the mixed solution into a specially engineered piping system for dispersal to strategically located spray headers. Dust control begins when the coal drops onto the conveyor at the bin opening. Two headers about 12 in above the apron conveyor treat the coal with the mixed solution, immediately smothering the dust before it has a chance to rise into the air. The coal rides up a 30-deg incline about 40 ft to the second application point. One set of headers at right angles to the conveyor sprays the coal as it flows from the apron conveyor onto the shaker screen. Another set treats the slate as it is crushed in the 30x48 Jeffrey slate crusher.

The system is fed from our head house near the mine entrance. Here the proportioning unit meters the compound into the water, and a pump transmits the mixed solution throughout the piping system. The sprays are remotely controlled at the discharge from the bin to the 48-in apron conveyor at the crusher location, and at the apron-conveyor discharge. Application is automatically controlled by a special control unit mounted under the 36 in raw-coal belt beneath the scalping screen. The weight of the coal on the belt makes the belt sag, which deflects the arm on the control, energizes a switch and thus actuates a solenoid valve which sets off the sprays. The sprays are shut off automatically when the coal has passed on.

Wetting action from the compound

Resistor life depends on adequate ventilation...

Patented P-G Grid Design assures maximum ventilation



Designed to fit your present resistor space

Resistor life depends on adequate ventilation and how efficiently heat may be dissipated . . . P-G grid design equalizes the amount of air space surrounding each leg or loop to obtain even heat throughout the grid area. (Note illustration.) . . . Since heat is rapidly and evenly dissipated, hot spots fail to develop and longer resistor life is assured . . . For a nonbreakable resistor (only steel and mica used) specify P-G on your next application.

P-G

The Nonbreakable Steel Grid Resistor

THE **POST-GLOVER** ELECTRIC COMPANY

OFFICE and FACTORY—Kenton Lands Road, Erlanger, Kentucky

MAILING ADDRESS—Box 709, Covington, Kentucky

Dust Control *(Continued)*

sprayed at the tipple lasts until the conveyor has transported the coal down the hill to the preparation plant.

The wetting has little effect on the moisture content or combustibility of the coal, as less than ½% moisture is added. Actual application is approximately 1½ gal of solution per ton.

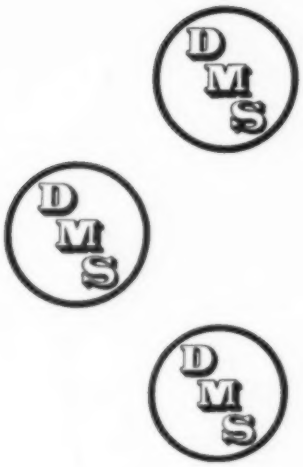
Cost—4 Mills per Ton

The entire Johnson-March Chem-Jet dust control system was installed in less than 3 wk. Our cost of operation has been less than 4 mills per ton of coal. All the results from this outlay, however, cannot be put down in dollars and cents. In addition to the obvious benefits of reduced danger of a dust explosion, better safeguards to health and improved employee morale and efficiency, we also have experienced a plus benefit in the form of improved community relations at the Lundale operations.

Formerly, black coal dust rolled upward from conveyor belts almost 16 hr every day and settled everywhere around the plant and community. Now, there is so little dust in the air that we have installed an air-drawn cooling system in the community's general store and painted the building light grey and white. This would have been impractical only a short time ago.

To demonstrate the system's effectiveness to visitors, we occasionally turn off the flow valves. Immediately the cloud of fine black dust begins to rise from the conveyor belts. Summary of the feeling in Lundale was probably best expressed by our F. L. McLain, vice president in charge of stores and purchases for the company, who commented: "I never knew that a simple installation such as this could make so much difference in the atmosphere in Lundale."

Favorable results from this installation have prompted us to start work on a similar Chem-Jet dust control system for the car-dumping operation at our Dana Slope mine, Rensford, W. Va. Here, we will control dust at both the rotary car dumper and at the discharge of the vibrating feeder. General purpose of the installation is to stop the dust before it can escape into the atmosphere, and hold it down during subsequent handling operations.



symbol of the coal industry's finest preparation system

DMS, the nation's leading dense media preparation system for 1954, 1955 and 1956, continues in the number one position. 16 new domestic and foreign DMS Coal Refineries were constructed in 1957 with a combined output of 3000 tons per hour.

DMS leadership is based on results.

Its the only Coal Preparation System handling big tonnages with better than 99% efficiency.

Significantly, in spite of many attempts at imitation—None have matched the unparalleled record of DMS for low operating costs, quality control or production of premium coal.

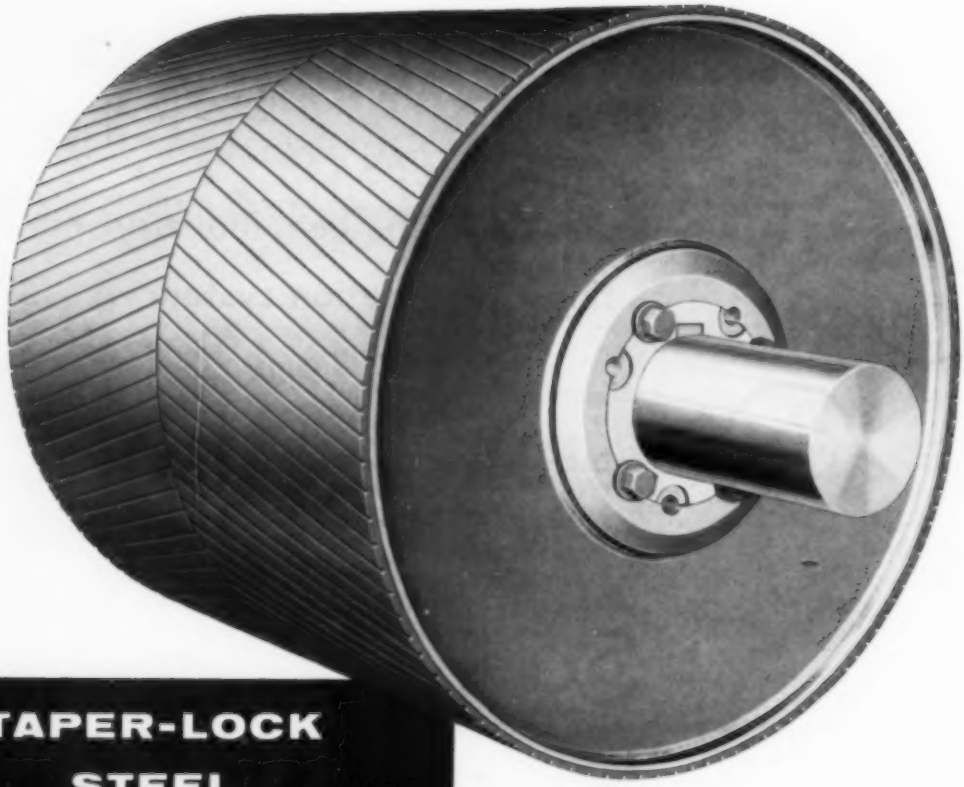
Find out for yourself how DMS can boost your coal profits. Arrange to inspect the DMS Refinery nearest you.

PAT. PENDING

THE DANIELS COMPANY

22 North Fifth Street, Indiana, Pa.

BRANCHES:
Bluefield, W. Va.,
Newark, N. J.



TAPER-LOCK STEEL CONVEYOR PULLEYS

Maximum strength with minimum weight...

Unmatched holding power on the shaft...

New mounting simplicity.

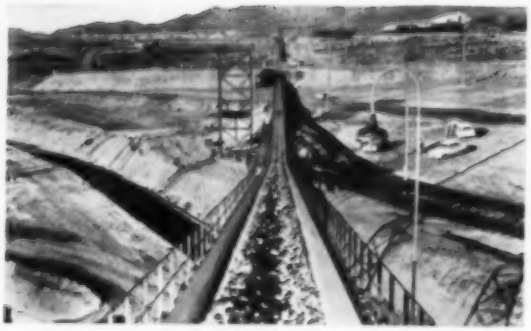
The rims, discs and hubs of these modern conveyor pulleys are *steel*—and they are fused together into jointless drum construction for (1) maximum strength with minimum weight, (2) exclusion of dirt, water, steam, (3) terrific shock resistance.

With the patented Dodge Back-up Bar, welds of full rim thickness are achieved—and the ultimate in strength is assured by submerged arc process welds.

Taper-Lock Steel Conveyor Pulleys *hold*. Taper-Lock provides the equivalent of a shrunk-on fit—there is no "walking" on the shaft. Mounting and demounting are simple. Pulley and bushings mount as a unit. Alignment is easy. And the tapered bushing is wedged into place merely by turning the mounting screws. It is "unlocked" by using the mounting screws as jack screws.

Available in diameters from 6 inches to 8 feet—all face widths. Standard or special rubber lagging available. Ask your local Dodge Distributor—or write us for bulletin.

DODGE MANUFACTURING CORPORATION, 3000 Union, Mishawaka, Ind.



97 Taper-Lock Steel Conveyor Pulleys are used in this famous conveyor system engineered, manufactured and erected by Hewitt-Robins, Inc., at the Southern Pacific's causeway construction across the Great Salt Lake.

DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

Yieldable Arch provides 'safety valve' against squeezing pressures

As its name implies, the Yieldable Arch is designed to give under the squeeze of heavy ground, instead of suddenly letting go. This yielding action gives the overburden a chance to settle slowly into a natural arch around the drift or tunnel.

Each set of Yieldable Arches is made up of rolled U-shaped segments, heavily flanged to resist torsion. Segments nest into one another at the ends to form a sliding joint which is secured by U-bolt clamps. The clamps are drawn up tightly enough to create friction joints which hold fast under normal loads. But when pressures bear down, friction in the joints is overcome and the segments slide, thus acting as a sort of safety valve to keep the steel arch from buckling or deforming under the crushing load.

Yieldable Arches are easy to install; no special tools or fancy equipment is needed. Your own men can set them up and take them down with only a minimum of supervision. And that brings up another important point: Yieldable Arches are usually recoverable for reinstallation elsewhere in the mine. They frequently pay for themselves within the first year of service. One of our engineers will gladly give you full details on the Bethlehem Yieldable Arch.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

BASIC RESEARCH . . .
More Practical Than You Think

This editorial, one of a special series on the importance of research to the American economy, deals with an aspect of our research program that may have serious consequences in future years — the lag in basic research.

An earlier editorial in this series noted: "The keen interest of U. S. business firms in scientific research points the way to a new kind of prosperity for our economy — a prosperity based on deliberate creativeness." As a result of the dramatic increase in industry's research expenditures, more new products will be introduced in the years 1957-1960 than in any previous four-year period.

A steady stream of new products and new processes means better values for consumers and lower costs for business. And thus it promises to sustain a high level of general prosperity that defies the old laws of boom and bust. **But, as we look further ahead, there is a danger that the stream of research discoveries may run dry because of our neglect of basic research.**

This danger was described by John Jay Hopkins, late founder and chairman of the General Dynamics Corporation: "Unless there is a revolutionary development in America of pure, not applied, science, there will come a day when there is no use in trading in your old car; because the new one is no better. The only difference between this year's television set and next year's will be the appearance of the cabinet! Scientific progress will be replaced by scientific stagnation."

What Basic Research Is

Basic (or pure) research has been characterized as the pursuit of knowledge for its own sake rather than to fulfill some practical objective. It is generally carried out in an environment which allows the investigator the freedom to follow the lead of his curiosity. The scientist in basic research, in the words of Glenn T. Seaborg of the University of California, is not concerned with "utilitarian goals, but a search for deeper understanding of the universe and the living and inorganic phenomena within it."

Impractical as basic research may seem in its initial purpose, it is an essential prerequisite to applied research and product development. A few examples will show how some of the greatest technical advances of recent years have come from basic research projects that had no immediate practical objective:

- **Radar** — an important military development of World War II with broadening commercial applications — was the outgrowth of a basic research project whose purpose was to obtain information about the height of the ionosphere, the layer of air that lies some 25 miles above the earth's surface.

- **Transistors** — the miniature devices which are already vital components of hearing aids, pocket radios and a wide variety of industrial equipment — were invented at Bell Laboratories (research subsidiary of the American Telegraph and Telephone Company) following university investigations into the electrical behavior of solids.

- **Neoprene** — a synthetic rubber — was developed by duPont with the help of basic information provided by Father Nieuwland of Notre Dame, who discovered he could control the polymerization (the linking together of molecules) of a certain class of organic compounds.

- **Nylon** — the first of the noncellulosic synthetic fibers that have revolutionized the textile industry — grew out of fundamental research by Dr. Wallace Carothers on long-chain polymers.

FASTER PENETRATION . . .

For hand-held drilling

For power-fed drilling

Joy CD-26 Coal Drill

. . . LONGER WEAR LIFE . . .

with CARMET DRILL BITS

Carmet coal drill bits—with unique tip designs—consistently drill clean, straight holes . . . *fast*, giving you increased production along with greater economy of operation.

Four different bit styles allow a range of selection to suit your mining conditions and drilling equipment, whether hand-held or power-fed. All styles are furnished with hardened alloy steel shanks, heavily backed at the tips to support a harder grade of carbide for greater wear resistance.

Extra carbide length along the outside cutting edge of the tip prolongs bit life and permits total use of the carbide. Cuttings are quickly, easily removed by the wide scoop design of the tool.

See your Carmet distributor for advice on the proper drill bits for your operations. He will be glad to help you set up a tooling program that will profit your operations. ***Allegheny Ludlum Steel Corporation, Carmet Division, Detroit 20, Michigan.***

Write for your copy of the CARMET MINING TOOL CATALOG and METHODS MANUAL

Illustrates full line of Carmet mining bits . . . giving tool dimensions, rake and clearance angles, etc. Specifies grinding wheels and procedures for reconditioning tool bits.

ADDRESS DEPT. CA-2

CARMET DISTRIBUTORS

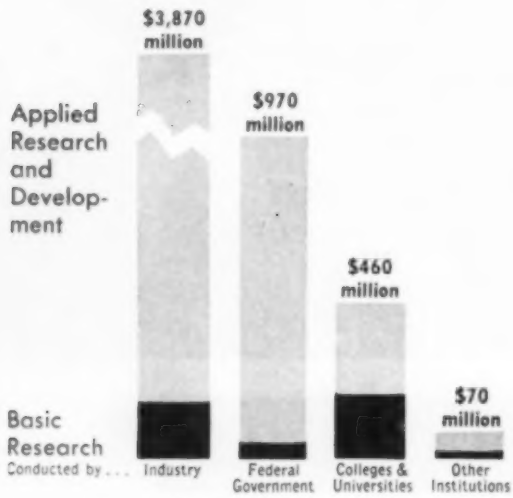
Brace-Mueller-Huntley, Inc.
Offices: Buffalo, Rochester & Syracuse, N.Y.
Carbon Transfer & Supply Co., Helper, Utah
Carlsbad Supply Co., Carlsbad, New Mexico
Consolidated Supply Co., Picher, Oklahoma
Crandall Engineering Co., Inc., Birmingham, Ala.
Drillmaster Supply & Mfg. Co., Evansville, Ind.
Gladstein Co., McAlester, Oklahoma
Leechburg Supply Co., Leechburg, Pa.
Marion Mine & Mill Supply Co., Whitewell, Tenn.
McCombs Supply Co., Jellico, Tennessee
Oglebay, Norton Mine Supply Div.,
Offices: St. Clairsville, Ohio;
Charleroi & Johnstown, Pa.
Persinger Supply Co., Williamson, W. Va.
Persinger's Inc., Charleston, W. Va.
Union Supply Co., Denver, Colorado
U. S. Steel Supply Co., Pittsburgh, Pa.
W. B. Thompson Co., Iron Mountain, Michigan

The Original DOUBLE-BONDED Carbide Bit

CARMET® AL

WBW 6810

Only 8% of All Research and Development in the U. S. is Devoted to Basic Research



Data: National Science Foundation, "Funds for Basic Research in the United States, 1953"

Industry's Stake in Basic Research

Industry traditionally has relied upon colleges and universities and other nonprofit institutions for basic research; and the U. S. has long benefited from the greater emphasis placed on basic research in Europe. It is conventional to think that business cannot, and should not, do much about "ivory tower" projects which do not have immediate practical application.

However, there is not so much in this idea as is supposed. The examples above illustrate what Caryl Haskins, president of the Carnegie Institution, has called "the widespread paradox that the most important practical consequences are commonly the least sought after." Furthermore, it is certain that, without adequate basic research, industry's efforts to produce new and better products will become progressively more difficult. And our national defense, in an age of breathtaking military applications of science, will become increasingly precarious.

In the past, our economic growth came largely through expansion into new lands or through discovery and development of rich deposits of natural resources. Such opportunities are relatively limited today. The great opportunities now lie in discovering new materials and new properties of the materials we already have. **This is the job of basic research, and industry has a vital stake in it.**

The chart indicates the tiny share of research efforts in the U.S. that is devoted to basic research. **Only 4% of all research by industry, and only 8% of all research in the U.S., during the year 1953** (the latest for which information is available) **represented fundamental research to add to overall scientific knowledge.** Even in colleges and universities less than half the research performed is basic research. At least one Nobel Prize winner has expressed the belief that we need and should work toward a doubling of the proportion of our total research effort that is devoted to basic research as soon as possible.

What Business Can Do

Without anything like a staggering increase in the total cost of its research programs, industry could do much to expand our basic research effort. Companies with big research programs should, as a matter of successful survival, be devoting a share of the effort in their own laboratories to basic research. Significantly, companies that are already doing a notable job of basic research have also made an outstanding record of translating such research into new products for industry and the consumer.

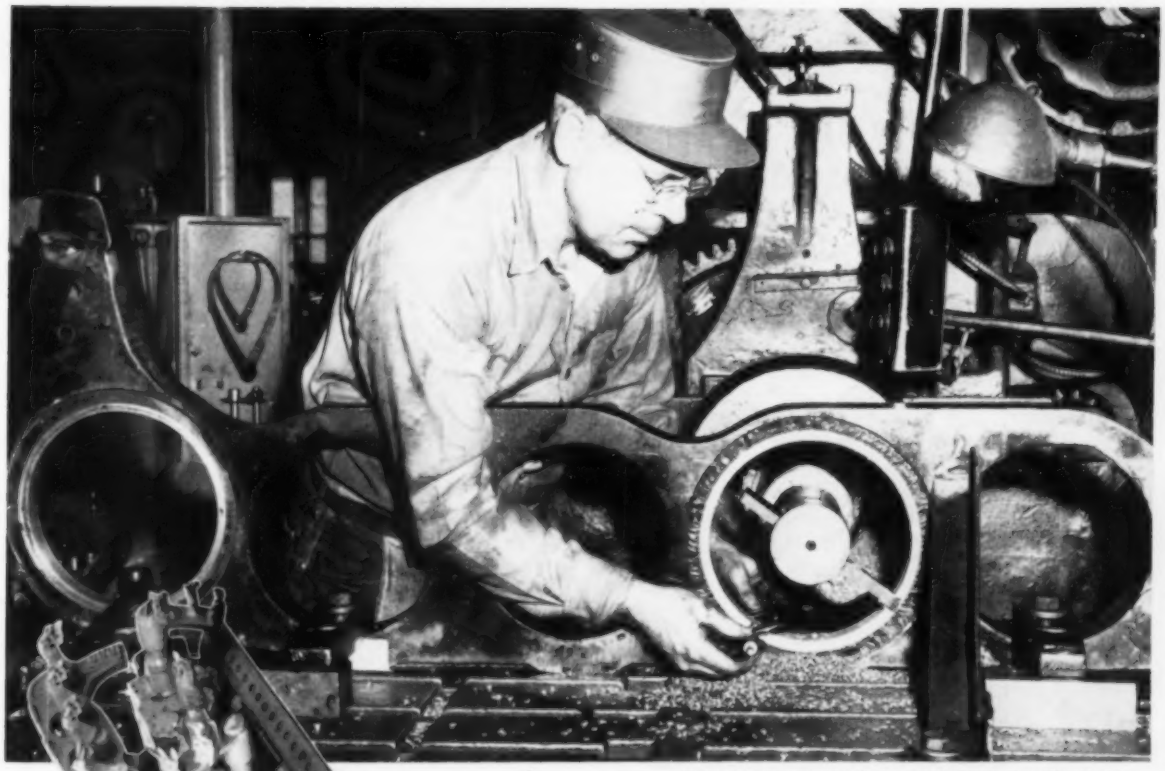
Smaller companies may rightly regard the conduct of research projects with uncertain prospects of reward as a luxury. Some basic research, indeed, never results in any tangible payoff. But, with modest contributions, small companies can still have a part in the advance of basic research. They can join together with other companies on cooperative projects. They can support basic research through trade associations and technical societies. They can help research centers in universities and other nonprofit institutions. Arrangements are available in some instances whereby business firms can pay a fee to have access to work done by university researchers.

One way or another, it is up to private business firms to see that basic research moves forward. By doing so they will be laying the groundwork for the development of the new products and technology on which their growth, and the growth of the economy, depend.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C. McGraw
PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.



Reboring 'cusp-cutter' to exact OEM Specifications at Leman's—a job not many are equipped for.

No Time Lost . . . Repairing Heavy Machinery

Because they have the facilities that assure fast, easy handling of even the heaviest mining machinery, Leman doesn't lose any time getting your equipment back on the job. And, as shown above, all parts are welded-up, straightened, machined and restored to their original condition. You get no warped or mis-fitting repairs back from Leman, where equipment is rebuilt as good or better than new.

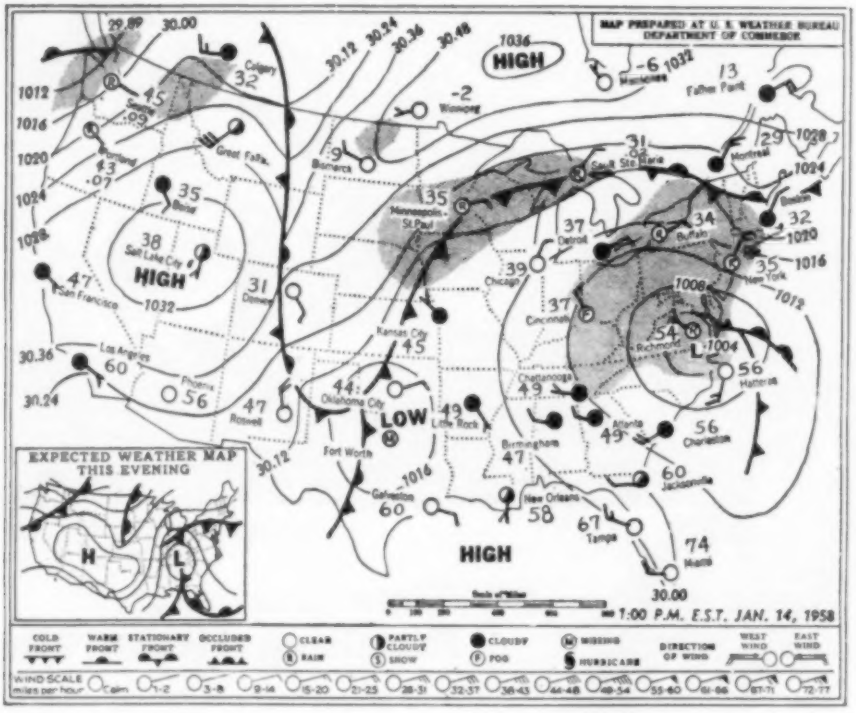
Prompt, repair service pick-up right at the job of damaged or worn equipment plus a complete, modern machine plant and full staff of specialists enables Leman to eliminate waste motion—save you time and money on repairs. Equipped to repair, rebuild or remodel all mobile loading and mining equipment and electric locomotives, Leman has lead in authorized equipment repairs for over 35 years.

Phone or write for prompt job-site pick-up and delivery.

LEMAN MACHINE COMPANY

Box 236 PORTAGE, PENNA. Telephone 2051

Foremen's Forum



READING A MAP like this may become a daily habit for mine foremen, since observers now detect a possible link between weather and explosion hazards.

The Weather and Coal-Mine Safety

MINE OFFICIALS might profitably take a good long look at weather conditions and how they affect coal-mine safety. It is agreed that the aneroid barometer is an important piece of equipment at any mine office and that it is consulted daily. However, there appears to be a need for closer observations of relative humidity, and perhaps a better correlation of pressure and humidity values.

C. B. McIntosh, associate professor of geography at Eastern Illinois State University, Charleston, Ill., brought up the subject in a report to the Illinois Mining Institute in October. Prof. McIntosh had done field research in Illinois mines on the effect of short term weather changes on gas and dust conditions. He has also studied the weather conditions associated with 385 major coal-mine explosions. His observations should be of interest to every supervisor.

Atmospheric-Pressure Effects On Methane Emission

In the field work, air samples were taken in standard bottles in the returns at southern Illinois mines during the passage of several low-pressure cells. Samples taken in summer, autumn and winter all showed an increase in methane content in mine air with a drop in pressure, as would be expected. However, a study of mine explosions and the associated weather conditions showed that on more than 50% of the days when bituminous explosions occurred the atmospheric pressure was rising. Thus, if a relationship exists between barometric pressure and bituminous explosions, it may be more important to be wary in periods of a rising barometer. This is a thought-provoking observation.

Passage of Fronts Affects Mine Moisture

A rising barometer indicates post-frontal weather conditions. Passage of a cold front generally is accompanied by a change in the type of air mass, from warm, moist air to colder, drier air. The lowering temperature and water vapor should tend to reduce the moisture content of the air and, in turn, reduce the moisture content of mine dust.

In studying the possibilities, Prof. McIntosh exposed dust of uniform particle size in an airway 1 mi from the intake. Samples of the exposed dust

Accident! But Anaconda SH-D Shovel Cable kept on working in this open-pit mine. Good proof of Anaconda Cable's ability to take it.

CAVE-IN! But this unposed photo shows Anaconda Shovel Cable still working!

Above you see part of an actual cave-in. The Man from Anaconda was Johnny-on-the-spot with a camera, and the picture shows part of what he saw. The complete cave-in was much more extensive.

We use this photo to show how well Anaconda Shovel Cable stands up under abuse. Jagged rocks, sheer drops over cliffs, water-filled ditches—the Anaconda cable is built to endure all these hazards.

We're miners ourselves. All our practical experience—plus knowledge of what makes the best insulation and protective coverings—has gone into this cable.

Anaconda Shovel Cable has a strong, extra-tough—yet highly flexible—neoprene jacket. It resists abrasion, mechanical abuse, flame and water. Its long-lasting Anaconda Butyl Insulation has high dielectric strength, and outstanding resistance to ozone, heat and moisture.

It all adds up to a cable that's ready when the going's rough. For full information about this rugged shovel cable, contact the Man from Anaconda or your Anaconda distributor. Or write directly to: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

58317

LIVE BETTER ELECTRICALLY

SEE THE MAN FROM **ANACONDA®**

FOR **SHOVEL CABLE**

were taken from the mine as four different cold fronts passed over the mine. In all cases, the moisture content of the dust increased under the influence of the warm, moist air preceding the front, and after the fronts had passed the moisture was reduced under the influence of the colder air.

Moisture loss was about 7% in 24 to 32 hr after the colder air moved in. In one case, the reduction was 11% in 42 hr. These results appear to show that the amount of moisture deposited in a mine in one day in July differs little from the quantity that would be deposited in one day under the influence of the warm, moist air ahead of a front. Furthermore, the moisture withdrawn in one day in January differs little from quantity removed under the air mass conditions following an April cold front. Prof. McIntosh observed that virtually the same change in moisture can be observed in a few hours, under specified weather conditions, as in the seasonal change from summer to winter.

Mine Explosions And Associated Weather

Weather conditions associated with 365 explosions were analyzed in the light of these field observations. It was determined that a high frequency of explosions occurred close to the time when a front passed the affected mine. Another group of explosions occurred about 24 hr after the passage of fronts. In most cases, the period between the time of cold-front passage and mine explosion, in the localities of the explosions, is marked by a rise in atmospheric pressure and a sharp drop in vapor pressure.

Getting down to cases, Prof. McIntosh pointed out that weather conditions associated with the recent Centralia and West Frankfort explosions in Illinois are remarkably similar. Both were under the drying influence of colder air for 25 hr before the explosions occurred. At Marianna, weather records show that a cold front moved over southwestern Pennsylvania, resulting in a sharp drop in vapor pressure between the time of lowest barometer and the explosion.

Prof. McIntosh sees the possibility of forecasting these hazardous underground conditions which result from changes in the weather. Special precautions should be taken at such times to prevent dust dispersion and distribute adequate rock dust. He also pointed out that average barometric pressure rises in the autumn months, thus forcing a buildup of methane in storage cavities. Therefore, the first deep low in barometric pressure following this period should receive special notice. (End)

Always keep a closed mind . . .

Diesel Energy Corp.

The Care and Feeding of a Grapevine, Or How to Run a Rumor Mill

Not just any jerk can walk into a plant or office and start a good red hot rumor . . . it takes years of experience in slinging the stuff.

And it takes a guy who wants to look like a big shot . . . even though he isn't one.

• First, care must be taken to avoid putting facts in the rumor. That's the easiest way to louse it up.

Of course, there are times when there is no choice but to include a few facts. But just make sure they're twisted enough so no one will recognize them.

• Starting rumors isn't much fun unless some confusion is caused somewhere along the slinging line.

The whole idea is to disrupt your fellow workers.

That's the enjoyment one gets out of planting a good juicy rumor.

• Choose the starting place of the rumor with the greatest of care.

Always go to people who don't think for themselves and plant the rumor with them.

It's as easy as planting weeds.

• Avoid Bright Listeners—Avoid starting the rumor where there's anyone around who is smart enough to know better.

That kind of guy will stop you cold by telling the truth. There's always a spoil-sport around who likes to stick to plain facts. So avoid them like the plague.

• Never be satisfied with just one planting. There's always the chance that by the time the rumor gets garbled by the grapevine, you may not recognize it as your own . . . then you'll fall for it just like the rest of the people.

Fortunately, there's always enough suckers around the mill or office who will fall.

• Size of the rumor is important, too.

Every successful rumor peddler realizes that the bigger the farce, the quicker it will be swallowed.

So why be satisfied with a small one when by letting an imagination run wild you can produce a real whopper.

• Be careful with timing. Never tell a rumor to a person who has nothing to do . . . he's liable to think things through and realize something's phony.

• Always Barge In—It's best to interrupt his work, his thinking or his conversation to blurt out your latest contribution to the grapevine.

• And never tell anyone that you're starting the rumor. Start off by saying, "I heard one of the big wheels," or "A guy who should know . . ." or "Did you hear the latest from the front office?"

That gives the rumor a ring of—if you will excuse the word—truth.

• It doesn't pay to hit the suckers too often. Make sure they forgot how wrong you were on the last rumor before you hit them with a fresh one.

• Even if you were 100 percent wrong on your last rumor (this will happen nearly every time), always go around bragging how you knew the hot tip before anyone else.

• And the more times you walk around saying, "I told you so, remember?", the easier it will be to set yourself up as an expert rumor factory.

So just follow these rules and you too can retail rumors with the best of them:

1. Always keep a closed mind.
2. Never read the bulletin board or company literature. (The facts will just cloud your thinking.)
3. Always tell your rumors to people gullible enough to believe them.
4. Never associate with smart people —(they catch on too quickly).
5. Always pass on someone else's rumor, maybe he'll return the favor some day.

—From *Keystone*, Pittsburgh Steel Co.

NEW JOY LOW-SEAM LOADER HANDLES 5-8 TONS PER MINUTE

FLEXIBLE For low seams, here's a high-tonnage loader that is flexible enough to be "custom tailored" to your mine. The 14BU-9 is available with a choice of 7½, 10 or 15 HP for the head motors . . . a choice of long or short conveyor . . . *AC or DC operation.*

RUGGED The 14BU-9, despite its low height, has all the rugged, high-speed features of larger Joy loaders. It loads 5 to 8 tons per minute. It's a simple design with maintenance and parts sections mounted outside the frame. The 14BU-9 has the famous Joy developed gathering arms with adjustable slip clutches. All controls are grouped at the operators station for finger tip control. In short: all the features that make a low seam loader fast and dependable.

PROVEN Although it is a new machine, the 14BU-9 has almost twenty years of experience behind it. Joy introduced the *first* 14BU loader back in 1939. Take advantage of this experience. If you are operating in low coal it will pay you to find out more about the 14BU-9. Write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ont.*

SPECIFICATIONS

Capacity TPM	5-8
Height, inches	26½
Width, inches	74
Length, long conveyor	25'5"
Length, short conveyor	23'1"
Gathering arm reach	80"
Machine Wt., approx. lbs.	20,100
Power requirements	440 volts AC or 250 or 500 volts DC

JOY MINING MACHINES ARE AVAILABLE IN AC OR DC MODELS

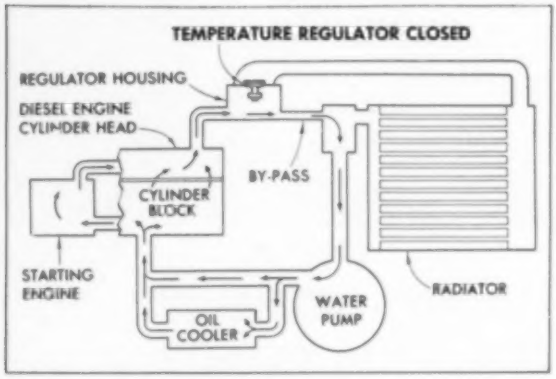
WRITE FOR FREE BULLETIN 230-1

See data on other Joy products in this issue

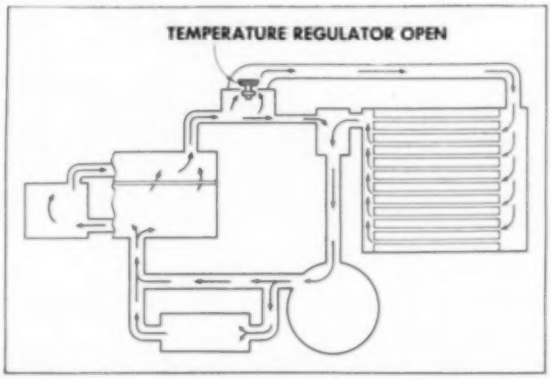
JOY EQUIPMENT FOR MINING . . . FOR ALL INDUSTRY

WBW CL 7001-250

Operating Ideas



WHEN temperature of cooling system is under 170 F, coolant circulates only through engine.



WHEN temperature of system is above 170 F, coolant flows through radiator for maximum cooling.

Cooling System Care Pays Big Dividends

By **V. A. Woodling, Manager**
Service Training
Caterpillar Tractor Co.

THE COOLING SYSTEMS of the diesel engines of most earthmoving machines are similar in design. Additional items such as an oil cooler, a torque converter, or cab heater vary the basic system only slightly. The little time required to properly care for this system will result in better machine performance, longer engine life and less down time.

The two schematic diagrams above show the basic cooling system found on most crawler tractors. In the left diagram the cooling system is operating with the temperature regulators open.—a normal condition when the temperature of the coolant is less than approximately 170 F. With the temperature regulators closed, coolant is circulated by the pump only through the cylinder head, block and regulator housing. A by-pass in the regulator housing returns the engine coolant to the pump inlet.

The diagram on the right shows the cooling system operating above 170 F. with the temperature regulators open. Here the coolant flows into the radiator permitting the maximum cooling capacity of the system to be used. These two diagrams illustrate the function of temperature regulators—the "watchdogs" of the cooling system.

Too often, however, regulators are unjustly accused of causing an engine to overheat. Usually the first thought is to remove and discard them at the first sign of overheating. Don't jump to this conclusion. Actually, overheating can result from a number of defects and incorrect operating procedures.

General Checks

Before removing and discarding temperature regulators, a systematic check of the cooling system should be made. Ordinarily, the first indication of overheating is noted on the temperature gauge. It should not be assumed that the temperature gauge is always correct. First, remove the radiator cap (caution should be exercised when doing this on a pressurized system), and insert a reliable thermometer into the coolant. This should be done with the engine running since coolant temperatures in the top tank rise immediately after shutting down an engine. If the thermometer indicates that the engine is overheating, a systematic check should be made to determine the cause. Begin with an inspection of the radiator core by looking for signs of scale, dirt or other clogging agents. Using soft water and a rust inhibitor will greatly reduce scale and rust deposits in the system.

A free flow of air through the radiator fins and around the engine is equally essential to adequate cooling. Inspect the radiator core fins to see if they are damaged or bent or simply plugged with mud or trash. A loose fan belt or bent fan blades are also a common cause of overheating. Operating a diesel engine at continuous overload is another.

If, after checking these items, the cause of overheating is not found, remove the temperature regulators. If the engine still overheats with the regulators removed, they are not the cause of the trouble and should be reinstalled immediately. Should the engine run at normal operating temperatures with the regulators removed, it is evident that they are at fault and new regulators should be installed. Do not operate the engine any longer than necessary with the regulators removed.

Check for Trapped Air

Air in the cooling system is another common cause of engine overheating. Air can enter the system in several ways. The most probable causes are a low coolant level, a loose or damaged precombustion chamber gasket or loose head stud nuts.

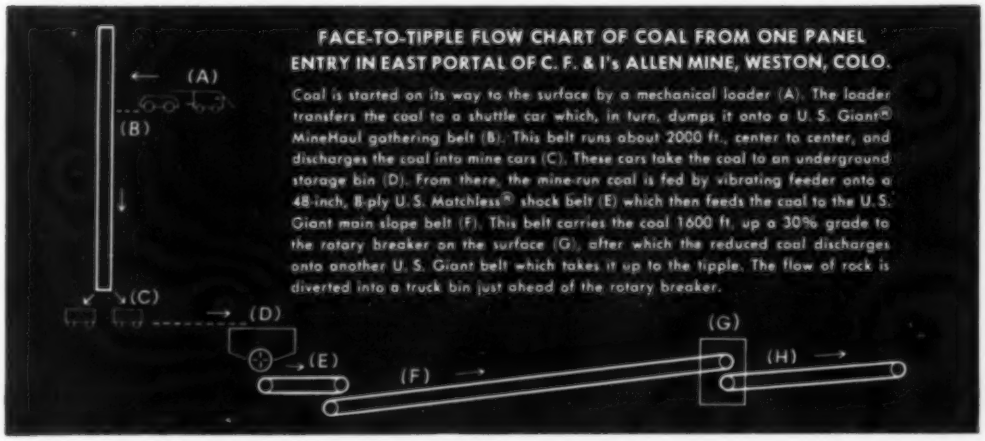
Air in the cooling system can result in cracked cylinder heads or other serious engine damage. If not quickly exhausted from the cooling system after completely filling the radiator, air will displace water from the cylinder head allowing the normally hot parts to operate at even higher temperatures.

A simple check, sometimes called the "bottle test," will indicate if air is present in the system. The equipment required to perform this check consists of a bucket of water, a length of hose which will fit over the radiator overflow tube and a quart bottle.

To begin the test, fill the cooling system and operate the engine at high idle for at least five minutes after the engine reaches operating temperature. Shut the engine down, make sure that the radiator cap is tight and place the rubber hose over the end of the overflow tube. Fill the bottle with water, insert the loose end of the hose into the bottle

CONVEYOR BELTS

NO TRAFFIC JAMS ON THIS UNDERGROUND HIGHWAY SYSTEM



FACE-TO-TIPPLE FLOW CHART OF COAL FROM ONE PANEL ENTRY IN EAST PORTAL OF C. F. & I's ALLEN MINE, WESTON, COLO.

Coal is started on its way to the surface by a mechanical loader (A). The loader transfers the coal to a shuttle car which, in turn, dumps it onto a U. S. Giant® MineHaul gathering belt (B). This belt runs about 2000 ft., center to center, and discharges the coal into mine cars (C). These cars take the coal to an underground storage bin (D). From there, the mine-run coal is fed by vibrating feeder onto a 48-inch, 8-ply U. S. Matchless® shock belt (E) which then feeds the coal to the U. S. Giant main slope belt (F). This belt carries the coal 1600 ft. up a 30% grade to the rotary breaker on the surface (G), after which the reduced coal discharges onto another U. S. Giant belt which takes it up to the tipple. The flow of rock is diverted into a truck bin just ahead of the rotary breaker.

30-inch, 4-ply, style XN, U. S. Giant Mine-Haul gathering belt receiving mine-run coal from shuttle car. Note use of U. S. Royalite® Skirtboard rubber to facilitate loading.

48-inch, 8-ply, U. S. Matchless Ustex®-Nylon main slope conveyor belt. It has already carried millions of tons of mine-run coal. Note the extreme conditions of cold and moisture.

This 320-ft. c-c belt is a 48-inch, 5-ply U. S. Giant. It carries minus one and one-half inch broken coal up a 9% grade from the rotary breaker to the railroad loading tipple.

The Allen Mine of The Colorado Fuel and Iron Corporation is one of the safest and most modern coal mines in the West. It is another fine example of engineering skills combining with U. S. Rubber belting to produce a maximum in efficient operation.

The mine was opened about five years ago and U. S. Rubber Conveyor Belts have been used almost exclusively in just about every phase of the face-to-tipple operation.

There has never been a belt failure and Mine Superintendent L. W. Ingles has expressed complete satisfaction with the belts.

For greater output at lower cost per ton, ask for U. S. Rubber's Three-Way Engineering. This service, plus a complete line of conveyor belting for any mining requirement, is available at the 28 "U. S." District Sales Offices or by writing us at Rockefeller Center, New York 20, N. Y.

In Canada, Dominion Rubber Co., Ltd.

Mechanical Goods Division

United States Rubber

See things you never saw before. Visit U. S. Rubber's new Exhibit Hall, Rockefeller Center, N.Y.

Operating Ideas (Continued)

and invert the bottle in the bucket filled with water. Start the engine and operate it at high idle. The following water displacement rates are considered maximum: Four- and six-cylinder engines—one pint per minute; eight-cylinder engines—one pint per 40 seconds; twelve-cylinder engines—1 quart per minute. If the water is expelled from the bottle in less time, air or gas leakage into the system is excessive and the source must be located and corrected. Continued operation with excessive air or gas flow into the system may result in serious engine damage.

Further possible causes of overheating may be in the water pump, or from restrictions in the water jacket, lines or hoses. One cause of overheating which should not be overlooked when trouble shooting crawler tractor cooling systems is a clogged crankcase guard. Dust, mud and other debris are good insulating materials which may cause the temperature of crankcase oil or torque converter fluid to be raised to such an extent that overheating in the cooling system occurs. Frequent inspections of the guard can prevent this problem.

Overheating of track-type tractor's diesel engine equipped with torque converter may result from several reasons other than those previously listed, since torque converter cooling is usually a function of the basic cooling system.

Check Torque Converter Operation

A torque converter, like most units transmitting torque, operates more efficiently through a certain range. The most efficient point of operation is when output shaft speed is equal to approximately one-half input shaft speed. However, satisfactory operation can be obtained when output shaft speed is as low as one-third or as high as three-fourths of input shaft speed. When the output shaft operates for extended periods of time at speeds that are lower or higher than the recommended speed range, the torque converter may overheat. Operation in the zero to one-third range indicates too great a load, while operation in the three-fourths and above range indicates too light a load is being applied to the torque converter. In either case, heat is generated by the rapid circulation of fluid. This heat must be absorbed by the unit's cooling system.

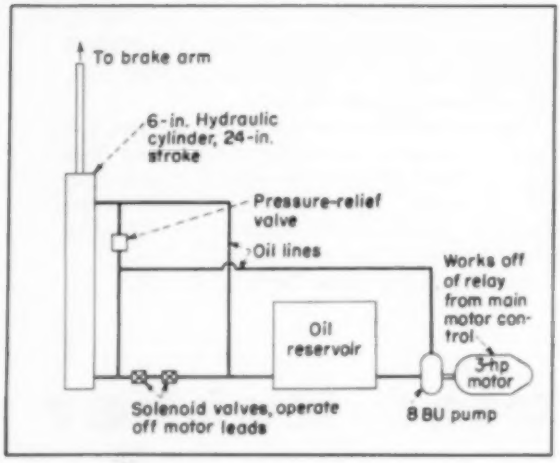
In no case should the engine be allowed to operate at or near high idle speed with the torque converter input shaft coupled to the engine and no load on the output shaft. Overheating will probably occur in a matter of minutes. Also, with the engine operating at low idle speed and the torque converter coupled to the engine, overheating will occur, but after a much longer period of time. If the torque converter is equipped with a clutch, the clutch should always be disengaged when the engine is idled. If the torque converter is not equipped with a clutch, experience will determine how long the engine may be safely idled at low speed before overheating of the torque converter will result.

In most cases, overheating of this type can be prevented by observing the torque converter temperature gauge and, when necessary, shifting gears or readjusting the load or engine speed to operate within the recommended limits.

Overloads on any engine for extended periods will, of course, result in slower fan speeds and, eventually, overheating.

Sign Gives Substation Data

KEY INFORMATION about underground substations can be read at a glance on special signs mounted outside all stations at Peabody No. 17 mine, Pana, Ill. Substations must be moved frequently at No. 17 and since a number of units are in service it is sometimes difficult to keep track of where they are, what area they serve and where the oil switch is located. All of this useful information plus the starting delay time and date of last inspection is posted on the sign Peabody mounted on the outside of each substation. Information is printed in chalk so changes can be made easily when the substation is moved to a new location.



Hydraulic System Replaces Thruster on Conveyor Drive

ONE ADJUSTMENT on a decline-conveyor brake in 3 mo compared to three in one shift is the report from Stonega Coke & Coal Co.'s Glenbrook mine where a hydraulic system was substituted for a conventional thruster brake. Before the hydraulic device was installed the company experienced difficulty keeping the maple blocks on the brake band in adjustment because the thruster stroke was only 6 in long.

To provide a longer stroke the company substituted a 6-in hydraulic jack with a 24-in stroke for the thruster and connected it to a hydraulic circuit. In addition to the hydraulic cylinder, the system includes a 3-hp 440-V 1750-rpm motor, 8-BU pump, pressure-relief valve, oil reservoir, solenoid valves and necessary tubing.

Tremendous savings at this strip mine using **D9** with Kelley Ripper

There are the figures—given to us by C. V. Jordan, mine superintendent and partner at the Ruby Chandler & Jordan coal strip mine near Madisonville, Ky. And here are his words:

"We're very satisfied with this Caterpillar D9 Tractor and Kelley Ripper combination. Since putting it in service we have reduced our cost from 9½¢ per ton using explosives to 2¢ per ton using the D9 and Kelley Ripper. It makes this D9 a dual-purpose machine since we can usually get all our ripping done in 2 hours, leaving it free to do dozing work in the pit."

The vein being ripped here is No. 11 coal, 6½ feet thick. In this grade, the CAT D9 Tractor rips furrows 12 feet apart, making 2 shallow passes and 2 deep cuts. In No. 12 coal, the furrows are 4 feet apart for better breaking action. At present, this mine is producing 3,000 tons per day.

Just as the D9 with the 8-foot Kelley Ripper is the way to save money breaking 3-foot to 6-foot thick seams, the D9 with No. 9 Ripper is the best money-saving method in seams of 28-inch or less thickness.

Have you switched over from shooting coal to these new money-saving methods? If not, get in touch with your Caterpillar Dealer. Let him show you the facts and figures; have him demonstrate at your mine. He has the best buy for you—and the best after-sale service and parts.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

**WANTED—
THE HARD WORK**

The shining Stainless Steel centrifuge basket fabricated by a large coal company resists the corrosion which ruined the more expensive non-stainless units previously used.

Stainless Steel ends sulfuric corrosion

in a major coal company's drying units

For more than a year now, wet coal has been battering against the sides of a Stainless Steel basket. It shows no signs of real wear.

This tough piece of equipment is one of the centrifuge baskets in a dryer. The basket receives a flow of coal in water, spins the load to force the water out through its open-ribbed sides, and passes on the dried coal.

The non-stainless baskets previously used cost $1,800, but didn't work too well. The ribs were weakened by sulfuric corrosion, they broke, they were almost impossible to repair, and they wore out completely in about three years.

The Stainless baskets the company now uses cost much less (about $600). Because they don't corrode from handling wet coal, they are stronger and last much longer.

When you think of replacing equipment for your coal-handling work, think of Stainless Steel. If you want service-tested quality, specify USS Stainless Steel, available from your local distributor.

USS STAINLESS STEEL

U N I T E D S T A T E S S T E E L

CENTRIFUGAL WILFLEY PUMPS ®

This Trademark Guarantees Money-Saving Performance

Day after day, in industrial plants throughout the world, the always-dependable quality of Wilfley Sand Pumps pays off in lower pumping costs. Wilfley Sand Pumps give you all these dollar-saving features:

- **Maintained high efficiency**
- **Longer pump life**
- **Quick, easy replacement of worn parts**
- **Rugged construction**
- **Versatility of interchangeable materials in wear parts: hard alloy irons or soft abrasion-resistant rubber.**
- **Simple, efficient design for trouble-free operation.**

Individual Engineering on Every Application

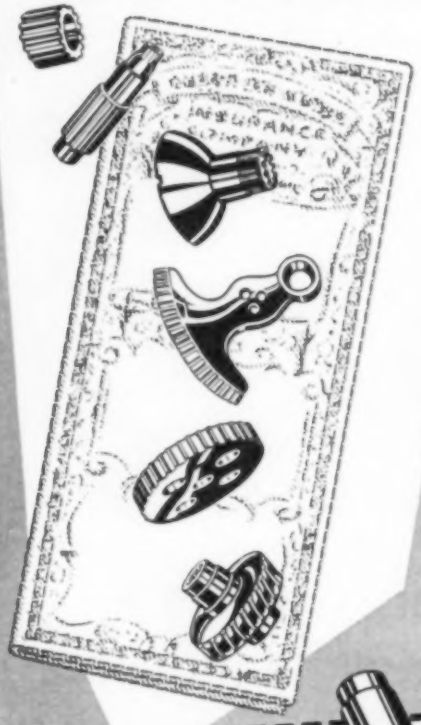
Wilfley Sand Pumps
"Companions in Economical Operation"
Wilfley Acid Pumps

Write, wire or phone for complete details.

A. R. WILFLEY and SONS, Inc.

Denver, Colorado, U.S.A. • New York Office: 122 East 42nd Street, New York City 17

PROTECT *YOUR* INVESTMENT!



ONLY KELLY
REPLACEMENT PARTS
ARE
Fully Guaranteed
AND BACKED BY
PRODUCT INSURANCE

KELLY
MANUFACTURING CO.

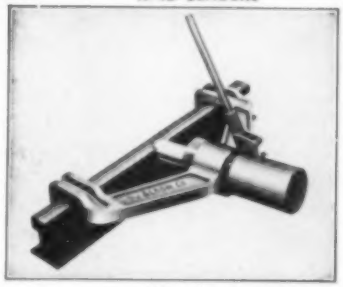
MACHINE PARTS DIVISION
CHARLESTON 21, W. VA.
★
STEEL FABRICATING DIVISION
MIDDLEPORT, OHIO

THIS HALLMARK IS YOUR GUARANTEE OF QUALITY REPLACEMENT PARTS.

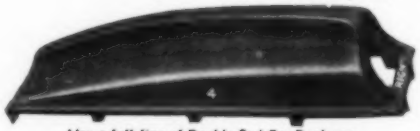
ALDON

WORLD'S LARGEST VARIETY OF CAR REPLACERS AND RAIL BENDERS

HYDRAULIC Rail Benders offer speed and ease available in no other benders. We have sizes for all rails, and many styles including Jack Type, Samson and Jim Crow.



At left: the UNIVERSAL Car Replacer — locks to rail. Any two make a pair. Ideal for low equipment.
Below: SINGLE-END Car Replacer — thousands in use in mining industry. Low gradual incline — positive as a switch point.



Also a full line of Double End Car Replacers
Write for Literature

THE ALDON COMPANY Dept. 258
3338 Ravenswood Ave. Chicago 13, Ill.

NO CONCRETE PIT!
Easiest to MOVE!

THURMAN

PORTABLE TRUCK SCALES

Engineered for rugged use in the field. Low initial cost, no maintenance. Can be used as PITLESS SCALE saves on pit costs.

CAPACITIES: 20 to 52 tons. DECK LENGTHS 18 to 43 ft.

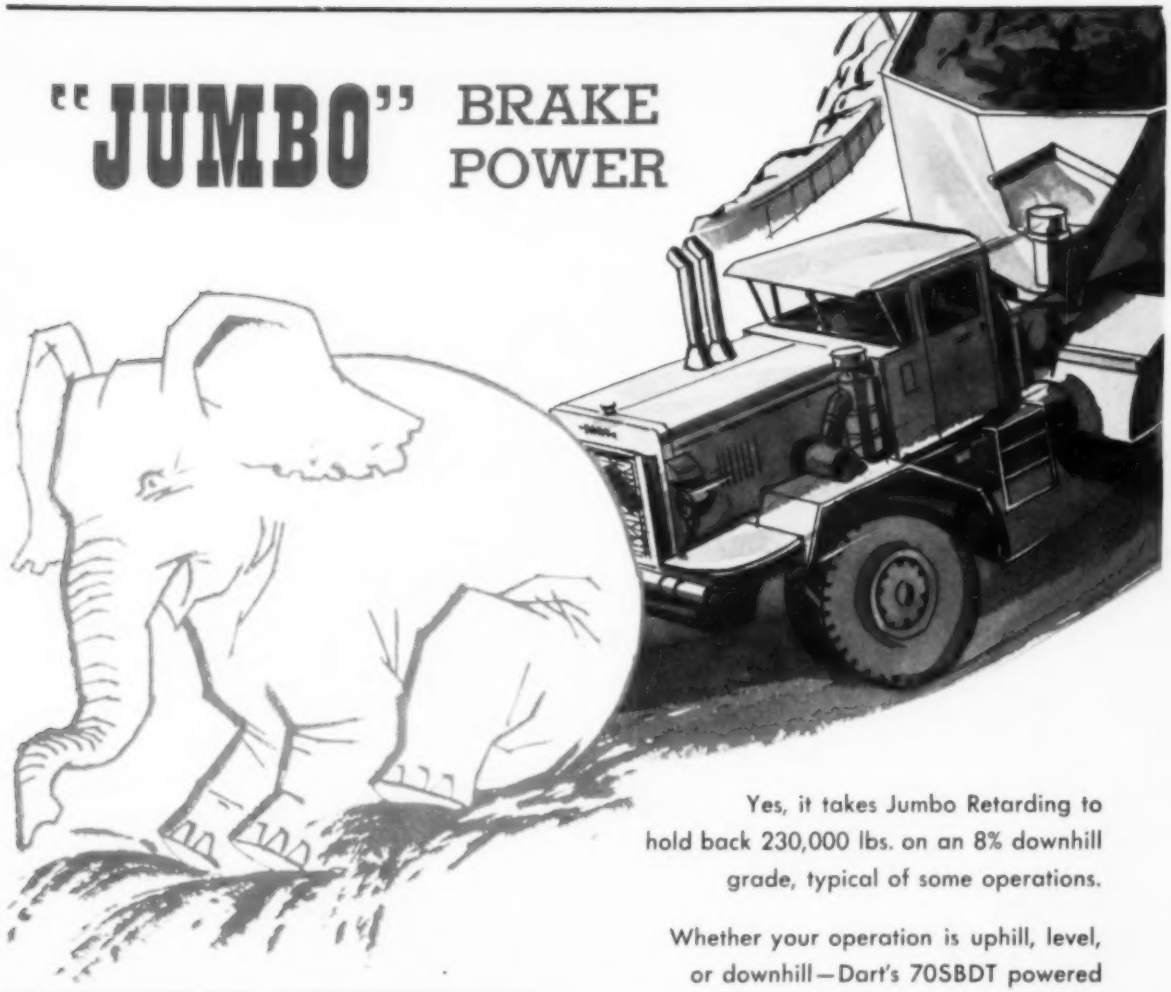
OTHER THURMAN SCALES: Pit • Warehouse • Industrial • Liquid Weighing • Wheelbarrow • Batching • Automatic

Precision Scales since 1918

THURMAN
SCALE COMPANY

156 N. 5th St. Dept. CA-1 Columbus, Ohio

"JUMBO" BRAKE POWER



Yes, it takes Jumbo Retarding to hold back 230,000 lbs. on an 8% downhill grade, typical of some operations.

Whether your operation is uphill, level, or downhill—Dart's 70SBDT powered by a 400 HP Diesel and a Torqmatic Transmission-Converter will give you "Jumbo" service.

"70 TONNER"

"50 TONNER"

WRITE FOR SPECIFICATIONS TODAY

POWER for the Climb
SPEED for the Haul Road

Heavy Duty Trucks Exclusively Since **1903**

DART TRUCKS

TONNAGE ENGINEERED

Kansas City 8, Missouri

SUBSIDIARY OF THE CARLISLE CORPORATION

D139

WIRE ROPE AT WORK

This tall skyscraper of the mining country is the headframe of the "A" Shaft, Mather Mine, operated by The Cleveland Cliffs Iron Co., Ishpeming, Mich. Sunk deep into the earth beneath the headframe are the shafts for the two balanced skips and the man-and-materials cage.

Each of the skips has a capacity of 12.5 long tons, and each is rigged with a Bethlehem 1⅛-in. 6x27 flattened-strand rope. A similar rope is used to hoist and lower the cage, while the cage counterweight rigging employs a 6x25 Type W line. These husky wire ropes have proved highly dependable in a system where a fast pace and high production must be maintained. Like all Bethlehem mine and quarry ropes, they have the toughness and stamina that mean lower costs per ton of material moved.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

MINING • QUARRYING • CONSTRUCTION • EXCAVATING • PETROLEUM • LOGGING • MANUFACTURING

AN IMPORTANT MESSAGE

TO USERS OF EXPLOSIVES

American Cyanamid Explosives Now Serve You Nationwide and Market-Wide!

In a move to extend and broaden the range of our services to explosives users, American Cyanamid Company has purchased the plants, magazines and sales facilities of Illinois Powder Manufacturing Company.

Because of these expanded facilities, it is now possible for Cyanamid to serve you better...faster...with a wider range of dependable, *quality* explosives, electric blasting caps and blasting accessories.

Our sales representatives will welcome the opportunity to analyze and discuss your blasting problems.

CYANAMID

AMERICAN CYANAMID COMPANY
EXPLOSIVES DEPARTMENT
30 Rockefeller Plaza, New York 20, N. Y.

SALES OFFICES:

Bessemer, Alabama
Denver, Colorado
Kansas City, Missouri
St. Louis, Missouri
Missoula, Montana
Albuquerque, New Mexico
New York City, New York
Tulsa, Oklahoma
Latrobe, Pennsylvania
Pottsville, Pennsylvania
Scranton, Pennsylvania
Dallas, Texas
Salt Lake City, Utah
Bluefield, West Virginia
Madison, Wisconsin

PRODUCTS:

High Explosives
Permissibles
Blasting Agents
Blasting Powder
Blasting Caps
Electric Blasting Caps
Seismograph Explosives
Blasting Accessories

ROAD CONSTRUCTION

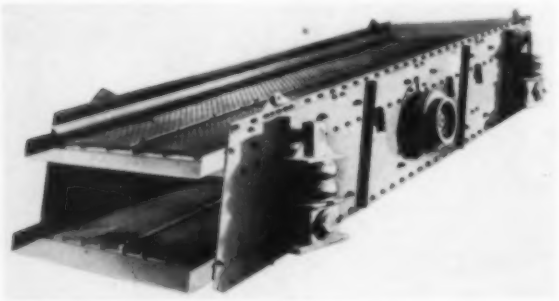
QUARRYING

METAL MINING

COAL

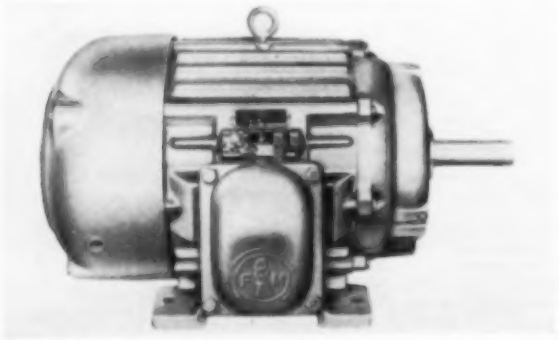
OIL EXPLORATIONS

Equipment Developments



Air Springs on Vibrators

Air springs on vibrating screens afford maximum isolation of vibration, quiet operation and reduced maintenance costs, according to an announcement from Allis-Chalmers Mfg. Co., Milwaukee 1, Wis., producers of the new suspension system. Constructed of durable nylon cord and high-tensile-strength, heat-resistant compounds, the air springs provide 98-99% vibration isolation, depending upon the air pressure used. They are easy to install and there are no mechanical parts to lubricate or service. One size can accommodate a wide range of screen sizes. The springs can be inflated from an air line, portable pressure tank, pump or air bomb. Air springs now are available on new A-C floor-mounted screens in sizes from 5 to 12 ft and larger. They can also be installed on floor-mounted screens in the field if the screen is already floor-mounted with dual steel spring arrangements on each corner.

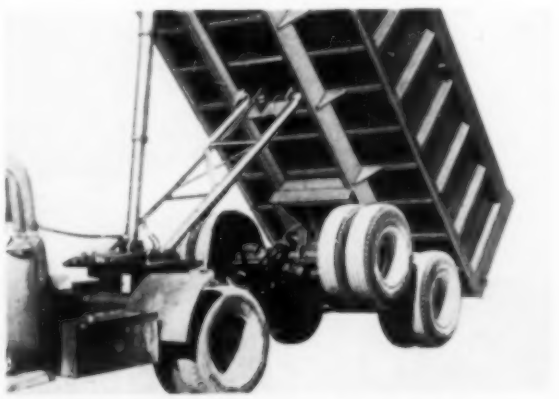


Explosion-Proof Motors

New totally-enclosed, explosion-proof motors, by Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill., are offered in both fan-cooled and non-ventilated models, all manufactured in accordance with latest NEMA standards and bearing Underwriters' Laboratories approvals. The motors are approved for use in gasoline and other explosive vapors, and in coal, coke or carbon-black dust. Type KZCX, in ratings from 1½ to 30 hp, is cooled by heat exchange between trapped clean air inside the motor and ventilating air circulated by an external aluminum fan. Type KZEX, in ratings of 1½ hp and lower, is cooled by convection and radiation, provided by rotor action and large ratio of frame surface area to volume. An improvement in design is a conduit box which can be rotated around the motor periphery to any of four positions, 90 deg apart. Connections can be made from either side, top or bottom positions on the motor.

Rotary Drill for 9-In Holes

A new "Portadrill," Model 105TA, engineered for blasthole and exploratory drilling in all strata, has completed field tests and is now being introduced by Winter-Weiss Co., 2201 Blake St., Denver 5, Colo. The drill is mounted on an Eimco 105 diesel tractor with 125-143-hp rating. Two rotary-vane compressors, furnishing 1,000 cfm, remove cuttings at normal pressures of from 15 to 17 psi. The compressors may be used singly or together. A collector hood at the top of the hole and a spray system protect crew and equipment from dust. In sandstone, shale, limestone and similar formations the 105TA performs at a rate of 300-400 ft of 9-in hole per shift, using standard roller-cone rock bits. Mast is raised and lowered hydraulically, patented "break-out" tongs speed making or breaking of stem joints and an automatic system maintains down-pressure on the bit. Complete specifications available from the manufacturer.



Frameless Trailer Hauls More

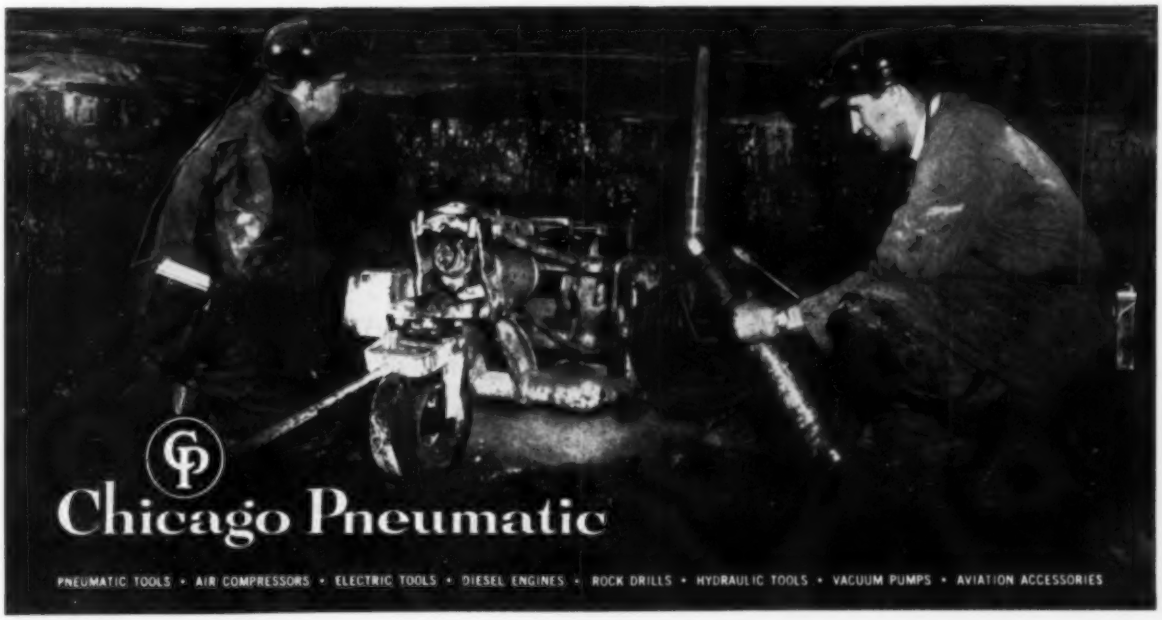
A new frameless dump trailer, of lighter weight than conventional units, is the latest addition to the line of bodies and hydraulic hoists manufactured by Marion Metal Products Co., Marion, Ohio. The FTD-570 is a 27-cu yd, 24-ft tandem-axle body raised by a front-end telescoping hoist. The trailer is available with single axle and in capacities and lengths to permit legal maximum payloads. Greater flexibility in maneuvering and spotting loads is claimed, since either the tractor

Where hole depth is less than 36", Chicago Pneumatic's RBD-30 Permissible Roof Bolting Unit can complete an entire roof-bolting cycle in 1½ minutes flat! In areas where deeper holes are required, CP completes the job in less than 3 minutes time.

The mobile RBD-30's low height gets it into low ceiling areas usually inaccessible to other machines. And the chuck is telescopic . . . can be adjusted 6" to meet roof irregularities. Built-in slip clutches prevent stalling . . . protect the drill and bolt setting motor. The Chicago Pneumatic RBD-30 is available with these extras: (1) water swivel attachment for wet drilling, (2) special low speed spindle attachment for slow speed drilling, (3) low seam drilling attachment for extremely low coal areas. Write for details. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, New York.*

CP drills hole and sets bolt

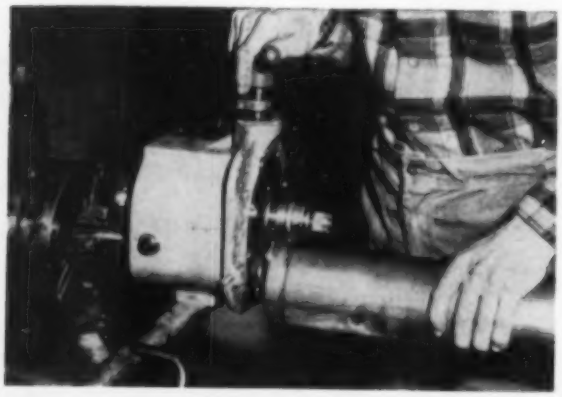
in 90 seconds!


Chicago Pneumatic
PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

or trailer can be locked in position by braking, with the hoisting action moving the free unit. A special upper fifth wheel is provided by Marion Metal Products. This may be mounted on a conventional lower fifth wheel if the latter is blocked to prevent pivoting.

50-Ton Bottom-Dump Combination

New planetary-axle tractor and matched bottom-dump trailer of 50-ton capacity have been developed for off-highway use by Autocar Div., White Motor Co., Exton, Pa. The new coal hauler is powered by either a 335- or 375-hp turbo diesel engine, features a full universal hitch between tractor and trailer, and permits interchangeability between tractor and trailer of such components as rear springs, brakes, wheel bearings and outer-end parts of the tractor's drive axle. The cab provides maximum field of vision for the operator. Power steering is standard, and the combination is equipped with a trailer jack-knife stop. Two heavy steel clamshell doors are operated by compressed air to dump loads from the bottom of the trailer. The tractor, Model AP-25t, is equipped with a nine-speed heavy-duty, close-space, progressive-shift transmission. It is available with optional single-stage, four-element torque converter and a constant-mesh planetary transmission with four speeds forward and two reverse speeds. These later components enable the driver to maintain momentum by permitting him to shift gears under full power.



Portable Pipe-Grooving Tools

Two compact portable tools that quickly roll grooves into lightweight pipe and tubing without removing any metal have been added to the line of pipe groovers developed by Victaulic Co. of America, Elizabeth, N. J. The portable tools, "Vic-Easy" Series 100 and Series 200, are adjustable from 1¼-in through 12-in diameters for on-the-job or shop use. The grooved pipe ends may be joined with Vic-Easy snap-joint, standard or lightweight couplings for water, air, oil or other lines. The Series 200 is constructed for use on pipes with heavier wall thickness; the Series 100 is for occasional jobs on thinner-wall pipes. Either may be used on steel, stainless-steel and aluminum pipe or tubing. User sets the pipe between forming rolls with the end of the pipe against a stop, then turns down roller feed screw to proper groove depth. There is no need to measure or gage dimensions. The grooving may be done manually or by power-operated vise, pipe machine, winch or hub drive of field trucks.

Transistor-Powered Radio

Communication Products Dept., General Electric Co., Syracuse, N. Y., offers 60- or 30-w transistor-powered mobile radios in low band (25-54 mc), and 25- or 50-w units in high band (144-174 mc). Transistorized power supply is built into both transmitter and receiver. The new radios may be used with either positive- or negative-ground 12-V DC systems. General Electric says the transistor-powered mobile units make possible more dependable communications. "Out of service" time will be reduced with transistorized power supply, and performance will be improved because of the reduction of electrical noise usually associated with vibrator power supply. This also results in extended range. Battery-voltage variation, from plus 20% to minus 50%, will not damage the power supply. Such damage may occur in vibrator-powered units.

Heavy-Duty Dump Body

Easier dumping is a feature of the new heavy-duty body now being offered by Gar Wood Industries, Inc., Wayne, Mich. The tailgate hinge point is 2 in higher than the top edge of the tailgate. This prevents the load from exerting a counter force on top of the tailgate, allowing it to swing free without bending or breaking. The new body incorporates box-type side braces for greater support for the side panels. Additional strength is provided by continuous welding around all side braces and the tailgate. A new wraparound angle brace strengthens the corner post and the entire rear end, and prevents bending of the floor at the rear edge.

B.F.Goodrich

Tires haul 25 tons of coal or rock, give strip miner 2 retreads!

SHENANDOAH STRIPPING operation of Reading Anthracite Co. Firm reports more mileage, more retreads with B.F.Goodrich tires.

SIXTY-THREE giant trucks haul 20- to 25-ton loads of coal for the Reading Anthracite Company of Shenandoah, Pa. Weather ranges from 10° below zero to 100° above. Roads are rocky, winding and mountainous.

Because of this tire-killing work, the Reading people were plagued by blowouts from rock impacts. Mileage was disappointing, and often tires could not be retreaded. Then the company began using B.F.Goodrich FLEX-RITE NYLON Rock Service tires. Result: substantially more service than from other tires—as many as 2 retreads per tire with up to 80% of original service on each retread.

This experience is typical. Miners report more retreadable tires and longer, trouble-free service from B.F.Goodrich Rock Service tires. Husky cleats grip the ground for positive traction in forward or reverse. And the B.F.Goodrich FLEX-RITE NYLON cord body is stronger than ordinary cord materials, withstands double the impact and resists heat blowouts and flex breaks. That's why it outwears even the extra-thick tread, can be retreaded again and again.

Your nearby B.F.Goodrich dealer will show you his complete line of money-saving tires for mine work. See him today or write *B.F.Goodrich Tire Co., A Division of The B.F.Goodrich Co., Akron 18, Ohio.*

Specify B.F.Goodrich Tubeless or tube-type tires when ordering new equipment

B.F.Goodrich Smileage

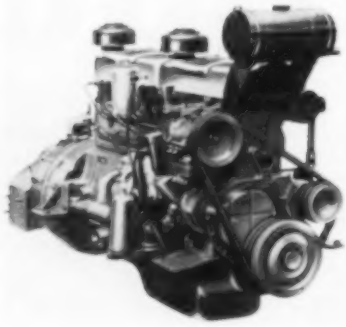
Your B.F.Goodrich dealer is listed under Tires in the Yellow Pages of your phone book

Rotary Drill

A truck-mounted rotary drill for air or mud drilling is available from Davey Compressor Co., Kent, Ohio. In addition to being suitable for all types of exploratory and core work in the mining and construction industries, the Model M-7WA unit is said to be useful for gas, oil and water-well drilling to depths exceeding 3,500 ft with 2⅞-in pipe and over 2,500 ft with 3½-in pipe. An important feature is its open-faced jack-knife mast. This eases use of extra wide breakout tongs and permits setting casings up to 30 in without moving the rig. It also results in a 96-in working area.

UHF Radio Transmitter

A new high-power UHF base station radio transmitter designed to give dispatchers of mobile communication systems up to 50% greater range is now in production by General Electric Co., Syracuse, N. Y. Engineered to deliver up to 250 w, the unit may be licensed for operation in the 450 to 460 mc band. The firm says that one of the main advantages of the new transmitter is that it helps to assure that a message will be received by a mobile radio even when the vehicle is unfavorably located. Design features are said to make it easy and safe to service, economical to operate, stable and reliable.

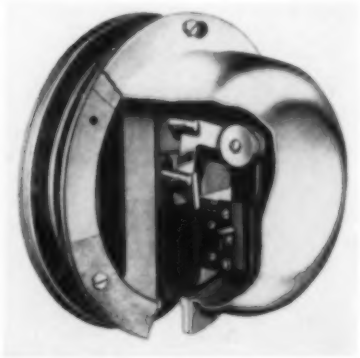


Diesel Engines

The OM 321 and OM 315 Mercedes-Benz diesel engines are now available in the United States through the Utica Div., Curtiss-Wright Corp., Utica, Mich. The OM 321 is available in sizes ranging from 60 to 96 hp and 1,500 to 2,600 rpm. Weighing 782 lb, it is a 6-cylinder, vertical in-line, 4-cycle, liquid-cooled engine with a compression ratio of 19.5 to 1. Quick starting in cold weather is said to be possible with glow plugs. The OM 315 has a compression ratio of 18.5 to 1 and weighs 1,775 lb. It provides the pre-combustion chamber type of combustion system together with Robert Bosch injection pumps and nozzle.

Centralized Lubrication

A new low-cost, low-pressure, positive-displacement type of lubrication system, called "Accumite," is announced by the Alemite Div., Stewart-Warner Corp., Chicago, Ill. The system is specifically designed to efficiently lubricate industrial vehicles and machinery which were previously not considered for centralized systems for economical or structural reasons. The system can handle a wide range of lubricants of the lighter grades and will handle many applications where experience has shown that frequent applications of lighter lubricants will replace infrequent applications of heavy greases. Four different types of lubricant pumps are available to serve 40 to 200 bearings in one stroke.



Bin-Level Indicator

An improved automatic bin-level indicator and control unit are available from The Bin-Dicator Co., Detroit 15, Mich. The most significant change, according to the company, is a twist-lock cover with no nuts or bolts. Another improvement is a vented housing, permitting a more sensitive and reliable operation. This vent relieves any pressure build-up in the housing as the diaphragm is flexed in response to the pressure of the material in the storage unit.

Automotive Differential

A new improved spin-resistant automotive differential which provides increased traction on snow and ice is obtainable from the Borg-Warner Corp., Chicago, Ill. The new unit is of simpler design and consists of fewer parts than others of this type now on the market, the company says. It is readily interchangeable with most existing conventional differentials and provides smooth completely automatic operation under all kinds of traction conditions. It is designed so it will never cause full locking of one axle shaft.

Strain-Gage Load Cells

A new series of strain-gage loading cells, for electrically weighing stationary or moving freight cars, trucks or carts,

How to select the right Link-Belt chain for specific coal service conditions

FILE HARD PROMAL makes this C-131 chain conveyor especially resistant to abrasive wear. Application is a tank-type heavy media vessel.

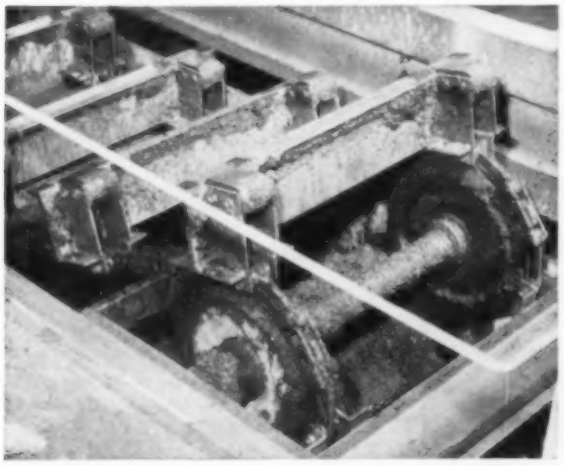
Use Class C chain for economy on drag conveyors, elevators

Here's a popular, durable, low-cost chain for elevator and conveyor applications. Because of its relatively broad top and bottom surfaces, it is particularly resistant to sliding wear, common to drag conveyor operation.

C Class chain combines two types of link construction into an economical chain assembly. Center links consist of simple, rigid and rugged castings . . . sidebars are made from selected steel . . . steel connecting pins are locked in the sidebars and only rotate in each end of the center link where generous bearing area is provided.

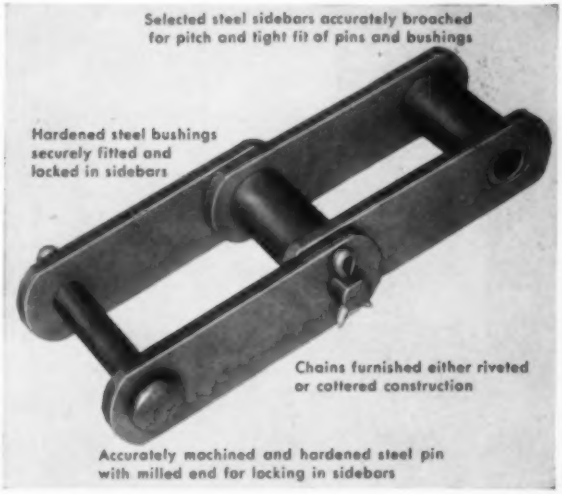
When conditions demand, Link-Belt manufacturing and application knowledge will produce a chain specifically tailored for your service. For example, center links are available in Promal and file hard Promal as well as malleable iron. Specially treated joints and special hardening in localized areas give greater wear-resistance. A wide variety of attachments is offered.

Lightweight rivetless chain is ideal for flight conveyors



FLIGHT CONVEYOR in coal preparation plant is a typical application of Link-Belt rivetless chain. It is ideally suited to this service, being high in strength and resistance to shock loads.

Although it has the light weight desired for long flight conveyors, Link-Belt rivetless chain offers the high strength at relatively low cost, needed to meet sudden impacts and heavy overloads. Open joint construction makes it ideal for operating in materials that have a tendency to pack. Simplicity of chain design permits dismantling by hand . . . lengths can be altered without tools.


Selected steel sidebars accurately broached for pitch and tight fit of pins and bushings
Hardened steel bushings securely fitted and locked in sidebars
Chains furnished either riveted or cottered construction
Accurately machined and hardened steel pin with milled end for locking in sidebars

LINK-BELT SS BUSHED CHAIN is especially engineered to resist chain joint wear under gritty or abrasive service.

SS bushed chain has extra-hard joint surfaces for abrasive jobs

Link-Belt SS bushed chain resists the abrasive wear encountered in coal handling operations. Hardened joint surfaces—up to five times harder than standard malleable, resist the cutting action of abrasive particles.

Sidebars of selected bar steel are accurately formed and machined for tight press fit of pins and bushings. These straight steel sidebars with hardened steel pins and bushings provide strength to prevent distortion under continuous heavy loads.

Many sizes of these heavy-duty chains are interchangeable with Link-Belt "C" Class. A wide range of attachments makes them adaptable to specific coal service requirements.

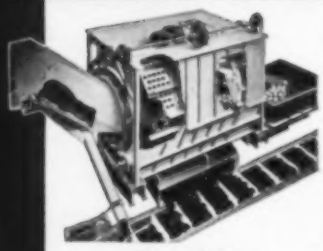
HEADQUARTERS for chains, sprockets and other Link-Belt conveying and mechanical power transmission products is your nearby Link-Belt factory branch store or authorized stock-carrying distributor.

LINK-BELT

CHAINS AND SPROCKETS

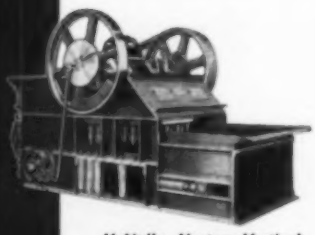
LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,723

America's most complete line of CRUSHING EQUIPMENT



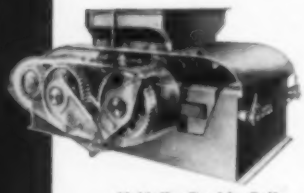
McNally Pittsburg Rotary Breaker

This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



McNally Norton Vertical Pick Breaker

50% Less fines when reducing lump to egg and stove sizes.

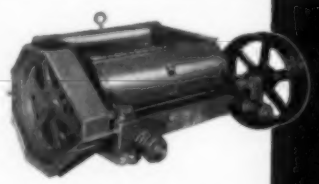


McNally Double Roll Gearmatic ROM Breaker

Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.

McNally Gearmatic Stoker Coal Crusher

This unit offers three prime advantages: high volume production, plus accurate sizing, plus low percentage of fines.



McNally Single Roll Crusher

Universal application 20", 24" and 36" diameter rolls.

AVAILABLE

From Stock and on Short Delivery

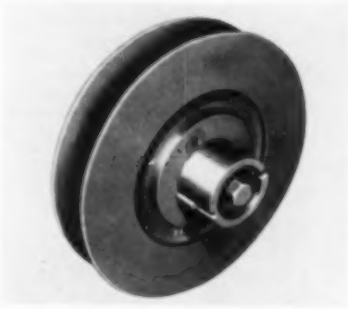
For immediate action on complete information write, wire, or call.

McNALLY PITTSBURG MFG. CORP.

Pittsburg, Kansas Wellston, Ohio

Equipment News (*Continued*)

incorporate a construction which provides up to 250% greater output with consequent reduction of interference from stray signals. Made by the Cox & Stevens Electronic Scales Div., Revere Corp. of America, Wallingford, Conn., the cells are designed in nine capacities, ranging from 500 to 200,000 lb. Rugged cell construction is said to permit 225% overload without affecting calibration.



Variable-Pitch Sheave

Wider speed changes and increased horsepower-transmitting capacity are attributes of a new S-Section Vari-Pitch sheave offered by the Allis-Chalmers Mfg. Co., Milwaukee, Wis. The new single-groove sheave has a range of 5.5 in minimum to 120 in maximum. It requires no more mounting space than is needed for the smaller R-Section sheave.

Fine Grinder

Successful fine grinding of particles to a half micron is possible in the modified Sturtevant Micronizer, a fluid-energy mill with no moving parts, made by the Sturtevant Mill Co., Boston, Mass. The fine grinder operates on the principle of superspeed rotation of particles produced by jets of compressed air or steam, which causes violent impact of the particles and results in fine pulverization without attritional heat.

Mobile Power Station

A source of electrical power for jobs where regular power is not available is offered by the "Electral" unit produced by the International Harvester Co., Chicago, Ill. The power station is available as a fast-hitch or trailing model for tractors with ASAE standard 1⅜-in-diameter 540-rpm power takeoff. It is said to be especially useful as a source of current for welders, motors, impact wrenches, drills, grinders and lights in making emergency repairs. Load capacity is listed at approximately 1,800 w at 115 V; 6,200 w at 208 to 220 V, single phase; and three-phase motors up to 10 hp on the 208-V.

Snaking-Line Gun

A gun which shoots line through conduit in seconds is offered by the Jet Line Gun Co., Charlotte, N. C. A packaged spool of nylon line is attached to a sealed cartridge of liquefied gas which is loaded into the gun. After the gun is inserted into the conduit, a trigger actuates a firing pin, puncturing a hole in the cartridge and releasing the compressed gas. The cartridge then travels through the conduit at high speed laying the line behind it. Effective distances of 400 ft in straight runs are said to be attained.

Point-to-Point Radio

Equipment to operate in the 890 to 960 mc UHF range and provide point-to-point radio circuits for remote control

Two-fisted for tough going!

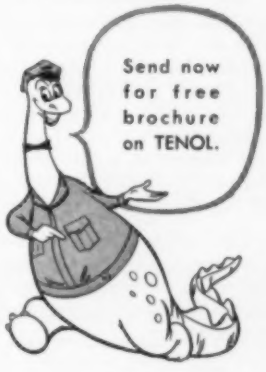
Your Diesel engines run better, last longer when you change to Sinclair Super TENOL® Motor Oil.

Sinclair Super TENOL safeguards your equipment against the damaging effects of high temperature and continuous stop-and-go operation.

Sinclair Super TENOL withstands such punishing conditions because it's specially made for tough going. High viscosity index base oils, combined with an exclusive formula of selected additives, give your Diesel the greatest protection against varnish, sludge, rust and acid corrosion.

Refill now with Sinclair Super TENOL Motor Oil. Contact your local Sinclair Representative for further information, or write Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N.Y. *There's no obligation.*

Dino, the Sinclair Dinosaur, says:



SINCLAIR SUPER TENOL

In this mine, slate is separated from coal underground and carried on another Quaker conveyor belt to the slate pile.

For fire-safety and ruggedness underground,

SPECIFY QUAKER FIRE RESISTANT CONVEYOR BELTING U.S.B.M. 28-11

Jagged chunks of coal and slate fall ten feet from the entry belt to this Quaker mother belt in one underground tipple. After 2 ½ years of constant service, the 2500-foot belt is still as good as new.

Now made especially for underground use where fire-resistance and flame-retardancy are musts, Quaker belting meets U.S. Bureau of Mines Designation U.S.B.M. 28-11 . . . in fact, far exceeds the standards set for it. For example, test flame was extinguished immediately, and afterglow disappeared in one-third the permitted time.

Call your Quaker industrial distributor for the full story, and for valuable assistance on *all* problems involving industrial rubber products.

FREE BELTING CATALOG
For complete information on all standard grades of Quaker conveyor belting, send for this illustrated catalog. Write QUAKER RUBBER DIVISION, H. K. PORTER COMPANY, INC.; Philadelphia 24, Pa., or Pittsburg, California.

H. K. PORTER COMPANY, INC.
QUAKER RUBBER DIVISION

Equipment News *(Continued)*

and other purposes is announced by Motorola, Inc., Chicago, Ill. Available in either upright indoor or weatherproof outdoor cabinets, the equipment is completely functional, including transmitter, receiver and power supply, and termination and metering facilities. The control station is provided with a loudspeaker and other audio termination equipment so that it can be used, if desired, without auxiliary equipment. The stations can also be supplied for point-to-point multiple channel communications, providing up to seven multiplexed channels for voice, teletype, telemetering and other uses.

Suction Line

Cutting nearly 90¢ off every dollar of cost per foot of suction line, plus a more serviceable line that is only one-third as heavy as conventional rubber or fabric line, is now possible with new suction line, according to W. R. Ames Co., Milpitas, Cal. Made of rugged aluminum, the line is easy to handle and move, highly flexible and rustproof. An engineered V-type suction gasket at each coupling permits an 11-deg off-center movement in any direction without breaking the suction seal. Ames equipment is available in a wide variety of sizes and fittings, using the newly developed Ames leakproof V-type neoprene suction gaskets with standard ball-coupler fittings.

Free Bulletins

CENTRIFUGAL FANS—Chicago Blower Corp., Franklin Park, Ill., now offers a 4-p bulletin describing the construction, specifications and operations of a new line of centrifugal fans, designed for heating, ventilating and air conditioning systems. All units feature either airfoil, flat or curved bladed wheels and can produce air movement ranging from 440 to 1,244,332 cfm.

GAS WELDING—Modern Engineering Co., 3409 Pine Blvd., St. Louis 3, Mo., manufacturer of "Meco" oxy-acetylene welding and cutting equipment, announces its revised 36-p equipment catalog covering applications of its complete

line of welding and cutting torches, welding regulators, industrial regulators, pressure gages, tank couplings, adaptors, hose connections and safety instruction manual.

ROTARY COMPRESSORS—The Kellogg Div. of American Brake Shoe Co., 530 Fifth Ave., New York 36, N.Y., tenders upon request a brochure illustrating and describing new rotary air compressors said to be smaller and lighter than reciprocating compressors of equivalent output. These 1 to 2-hp pumps supply air in the 150 to 175 psi range.

STEEL PLATES—The Colorado Fuel & Iron Corp., 575 Madison Ave., New York, N.Y., has prepared a new 4-p folder on Clay-Loy high-strength steel plates and has announced that the product is available. The plates are said to be lighter in weight yet stronger than carbon steel of the same thickness. In addition it is stated that they have excellent welding properties and are highly corrosion resistant.

SLURRY PUMP—Morris Machine Works, Baldwinsville, N.Y., has released Bulletin 185 describing capacities and applications of its heavy-duty low-speed RX slurry pump for cement, sand, coal, solids, etc. The brochure provides operating data and specifications for continuous duty—heavy, fine or coarse slurries.

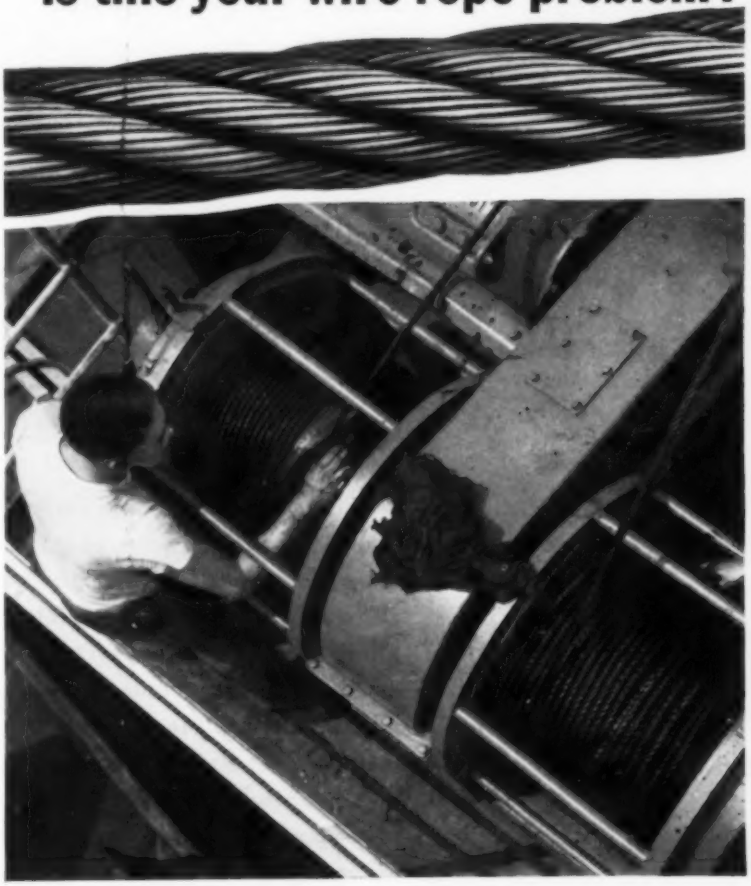
COATED METALS—Small Business Administration, Washington, D. C., offers a new 4-p pamphlet on the use of ceramic-coated metals in small plants. The booklet, written by Frederick D. Shaw, vice president, Bettinger Corp., a designer and processor of ceramic coatings on metals, gives technical information that will enable technical and manufacturing personnel in companies to determine whether or not ceramic coatings can help them in increasing resistance to shock, abrasion and corrosive media.

INDUSTRIAL HEATER—American Air Filter Co., Inc., Louisville 8, Ky., has out a bulletin describing the construction, application and performance features of the Herman Nelson industrial heater. Bulletin 750-A explains in detail the operation of the heating and ventilating unit that is designed to meet industrial requirements, whether for make-up air or for plant heat load.

TRUCK MODELS—International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill., has come out with a full-color catalog describing six heavy-duty International all-wheel-drive truck models of cab-forward design. All units described in the catalog are available with either gasoline or LPG engines.

lubrication...

is this your wire rope problem?



Send for free guide to correct methods that lengthen service life, cut wire rope costs...

ASK FOR RED-STRAND SERVICE BULLETIN NO. 103

To understand the urgent need for correct lubrication of wire rope, think of it as a machine with many moving parts. All its wires and strands are constantly stretching, twisting and rubbing against each other while the rope as a whole is rubbing against sheaves, drums and the like. This creates friction from end to end and wear will be excessive unless the rope is kept in condition with the right kind of lubricant correctly applied. The whole subject is very clearly explained in Service Bulletin No. 103 which is yours for the asking. Write today to H. K. Porter Company, Inc., Leschen Wire Rope Division, St. Louis 12, Missouri.

LESCHEN
Red-Strand
WIRE ROPE

H. K. PORTER COMPANY, INC.

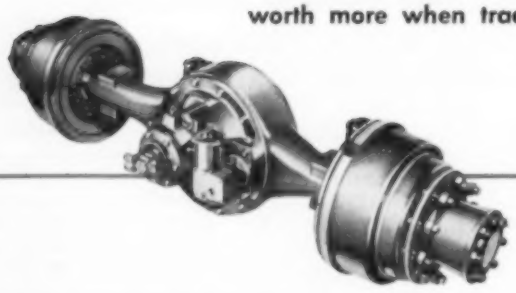
LESCHEN WIRE ROPE DIVISION

In the Coal Industry—

Eaton 2-Speed Axles Keep Trucks on the Job —Cut Operating and Maintenance Costs

Pulling out-of-the-hole in off-the-highway operation, making time on the hills, maneuvering in heavy traffic, highballing on the open road — each calls for a different gear ratio to assure maximum efficiency, economy, and safety. Eaton 2-Speed Axles *double* the number of available gear ratios, permitting the driver to use the one best suited to road, load, and traffic conditions. This use of the *right* gear ratio for every situation permits engines to run in their most efficient and economical speed range, reducing stress and wear on all power-transmitting parts. Not only do Eaton 2-Speed Axle trucks make more and quicker full-load trips, but they do it at lower operating cost and with less maintenance; they stay on the job and out of the shop. Even under the roughest conditions, trucks equipped with Eaton 2-Speeds last thousands of miles longer — and they're worth more when traded in.

More than Two Million Eaton Axles in Trucks Today. For complete information, see your truck dealer.



EATON — AXLE DIVISION — MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Engine Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Hydraulic Pumps Motor Truck Axles • Permanent Mold Gray Iron Castings • Forgings • Heater-Defroster Units • Automotive Air Conditioners Fastening Devices • Cold Drawn Steel • Stampings • Gears • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

Equipment News (*Continued*)

GRIT COLLECTING—Link-Belt Co., Dept. PR, Prudential Plaza, Chicago 1, Ill., makes available a booklet discussing grit collecting and washing. It contains data on seven types of grit collectors, two grit washers and the Tritor screen, which is a combination grit collector and mechanical screen manufactured by Link-Belt Co.

INDUSTRIAL HEATING—Westinghouse Electric Corp., P.O. Box 2099, Pittsburgh 30, Pa., offers a booklet entitled "Industrial Electric Heating Units and Devices." The 24-p booklet describes a wide variety of heating units—strip heaters, oven heaters, immersion heaters . . . bolt heaters and industrial hot plates.

HAT LINERS—Mine Safety Appliances Co., Pittsburgh, Pa., is showing a new assortment of winter liners for all their protective hats, and offers an illustrated folder to those interested. Photographs of the individual liners are appropriately labeled to identify features that contribute to both the comfort and safety of the wearer.

GRADER ATTACHMENTS—The Construction Machinery Div. of Allis-Chalmers Mfg. Co., Milwaukee 1, Wis., presents a folder in which accessories and attachments for Allis-Chalmers motor graders are illustrated and briefly described. It will serve as a handy reference to owners and users of Model 45 and Model D motor graders.

GLOVES—Mine Safety Appliances Co., Pittsburgh, Pa., describes gloves made of five types of molded rubber and synthetic materials in various weights, sizes and types in its new 8-p Bulletin 1310-2. A line of finger cots is also included.

DUST COLLECTION—Ducon Co., Inc., Mineola, N.Y. offers a new 6-p bulletin on dust-collection equipment. The literature describes and illustrates the company's complete line of wet and dry-type dust collectors and auxiliary equipment, including cyclones, centrifugal and dynamic washers, dust and fiber filters, discharge gates and trickle valves.

DUST FILTERS—The W. W. Sly Mfg. Co., Cleveland 1, Ohio, makes available bulletin No. 104, describing the complete line of Sly dust filters and giving detailed information about dust-control systems and how to engineer them. The engineering section outlines a step-by-step procedure that can be followed in determining type and size of hooding, piping and dust filter. Tables are also provided for clarification of dust control systems.

HUBER-WARCO motor graders

5D-190 in service on haul roads

When it comes to building and maintenance of haul roads, the Huber-Warco 5D-190 MOTOR GRADER is a natural. This rugged, powerful (195 h.p.) will open new roads, or smooth out existing haul roads to keep profitable payloads traveling. Big, yet easily maneuvered, the Huber-Warco 5D-190 features a diesel engine, torque converter, tail-shaft governor and power-shift transmission. Once the operator sets the speed the tail-shaft governor maintains it, regardless of load conditions. Operators favor this unit . . . NO CLUTCH . . . hydraulic controls . . . booster steering . . . it's easy to handle. There are many other outstanding features that make all Huber-Warco motor graders the most profitable on the job. See your Huber-Warco distributor for details on the complete motor grader line ranging from 75 to 195 h.p.

A product of HUBER-WARCO COMPANY, Marion, Ohio, U. S. A.

HUBER-WARCO COMPANY, Marion, Ohio, U.S.A.
Send me specifications on the Huber-Warco
☐ 5D-190 ☐ other grader models
☐ Send me the name of my nearest Huber-Warco distributor

Name .....
Title .....
Company .....
Address .....
City ..... Zone ..... State .....
2-CA

HUBER W WARCO

TAKE ADVANTAGE OF YOUR "EXTRA MAN"

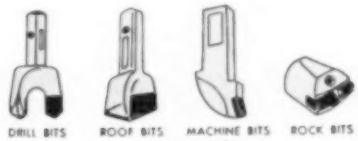
Your KENNAMETAL* Representative is a specialist in solving underground problems with Carbide Tooling

Your Kennametal Representative can help you with many of your mining problems. He has solved mining problems as a supervisor at the face. Also, he has been trained in the selection and use of the proper cemented carbide cutting and drilling tools. Chances are that during his years of field experience, he has encountered and helped solve the same problem facing you now.

A Kennametal Representative can help your personnel get top bit performance and the lowest possible bit cost by the proper use and reconditioning of Kennametal tools. Why not take advantage of this practical experience and technical training? Let your Kennametal Representative help you select the tool designed to give you long bit life, higher production, lower cost per ton. Why not give him a call? You'll find his name listed in the Classified Section of your Telephone Directory under "Mining." KENNAMETAL INC., Mining Tool Division, Bedford, Pennsylvania.

*Trademark

INDUSTRY AND
KENNAMETAL
...Partners in Progress



Equipment News (*Continued*)

CONTROL CABLES—General Electric Co., Wire & Cable Dept., Bridgeport 2, Conn., has issued a 4-p bulletin on polyethylene Flamenol control cables. The bulletin gives detailed information on construction and application of this cable which can be installed in wet or dry locations, either aerially or buried indirectly. Test data on the cable are also furnished.

COLD CLEANER—Dow Chemical Co., Midland, Michigan, makes available a new booklet outlining properties and uses of Chlorothlene, a cold-cleaning solvent which finds use in numerous industries. It has been used in the coal industry for cleaning of tools and equipment and as an analytical chemical. Other uses for this solvent are adhesive manufacture, aerosols, spray cleaning of electrical equipment, lubricant carrier, and fabric cleaners, according to the firm.

MINE DRAINAGE—Saverite Engineering Co., Hoboken, N.J., has out a publication on chemical methods for purging and maintaining mine-drainage and coal-preparation-plant process water. Simplified water analyses and application methods are part of the system and can be used by the mine operator for determining the extent of treatment required, reports the firm.

V-BELTS—Goodyear Tire & Rubber Co., Akron 16, Ohio, offers Bulletin No. S-51107 on testing, inspection and control of quality of their V-belts. It describes in words and pictures how raw materials and finished belts are tested and inspected. One section of the book explains quality control procedures and another is concerned with experimental production.

FLOODLIGHTS—Stonco Electric Products Co., Kenilworth, N.J., announces a new bulletin telling of floodlighting fittings for building facades and other structures where night lighting is needed. Products include surface-wall and thru-wall mountings that make-up approved floodlights without the need and extra cost of installing separate splice boxes.

LUBRICANTS – Whitmore Mfg. Co., Cleveland 4, Ohio, specialist in gear, bearing, cable, chain and cam lubrication, offer a special booklet on how to properly lubricate open gears, dipper sticks, and cams in manufacturing, mining, etc. The new folder describes 15 Whitmore formulas and tells how these lubricants adhere to metal surfaces without "squeeze-out" or breakdown under exceptionally heavy pressures.

HUBER-WARCO
motor graders

designed for rugged haul road work

Balanced weight and power to meet every grading requirement . . . that's the Huber-Warco 5D-190 MOTOR GRADER. A 195 h.p. diesel engine in combination with a torque converter, tail-shaft governor and power-shift transmission gives more power at the blade for faster passes and smoother cuts. Operators like the 5D-190 . . . there is NO CLUTCH . . . they just set the desired speed and the tail-shaft governor maintains the speed regardless of load conditions. The complete hydraulic cab-controlled blade movement is another important feature. In less than a minute, and without ever leaving the cab, the operator can move the blade from a 90° bank sloping position on one side to 90° on the other. There are NO manual adjustments to be made. These bonus features add up to MORE grader production. See your Huber-Warco distributor for complete details on the torque converter and standard transmission graders ranging in horsepower from 75 to 195 h.p.

A product of HUBER-WARCO COMPANY, Marion, Ohio, U. S. A.

HUBER-WARCO COMPANY, Marion, Ohio, U.S.A.
Send me specifications on the Huber-Warco
☐ 5D-190 ☐ other grader models
☐ Send me the name of my nearest Huber-Warco distributor.

Name _____
Title _____
Company _____
Address _____
City _____ Zone ____ State _____

2-CA

HUBER W WARCO

EXIDE-IRONCLAD BATTERIES

—best buy for the long haul

More ton-miles per dollar—that's the reason most cost-conscious mine operators prefer Exide-Ironclad Batteries for mine locomotives.

Experience has proved over the years that no other battery make matches Exide-Ironclad for average life in service and tonnage hauled. Rating for rating and dollar for dollar, Exide-Ironclad gives you more real value . . . more return on your investment.

Today's Exide-Ironclad features improved tubular construction, making it even better than the models that chalked up the industry's records. So you can expect even longer life potential and superior performance.

Total work output, not mere price, is the key to battery economy. When you buy batteries, specify Exide-Ironclad and get the most production capacity your dollar can buy. For details, write Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

High-capacity, long-life tubular construction. Gives positive plate one-third more surface area for greater power reserve. Power tubes hold active material securely for long battery life.

Exide®

Among the Manufacturers

Modern Plant

New plant facilities consisting of 40,000 sq ft of manufacturing area, is in full production for the Stephens-Adamson Mfg. Co. at Clarksdale, Miss.

Completely modern, the new plant will fabricate component parts for conveyor systems which are also produced at the S-A Aurora, Ill., manufacturing division. It is expected that the Clarksdale division will fill an important role in supplying Stephens-Adamson's southern market, as well as supplementing distribution of products in other areas. The company engineers conveying systems and builds a broad line of bulk materials-handling equipment.

New Divisions Formed

Four new electric control product divisions and appointment of two general divisional managers have been announced by Clark Controller Co., Cleveland, Ohio.

The divisions are: Automation Div, to handle engineered control systems; Package Drive & Control Centers Div, to handle standard, modified standard, and specially-engineered packaged speed control drives and control centers; Crane & Mill Accessory Controls Div, to handle heavy-duty, standard and modified standard control equipment for materials handling; Standard Products Div, to handle standard and modified standard general-purpose starters, relays, limit switches, etc. R. L. Puette has been named general divisional manager for the heavy-duty and specially-engineered equipment group, and B. H. Carlisle has been named general divisional manager for Standard Products, Renewal Parts and American Electric Switch Divisions.

Frank K. Platt, president of Air Engineering Co., has been named to the newly-created post of central regional manager for products of American Air Filter Co., Inc.

Mr. Platt has relinquished his affiliation with Air Engineering Co. and will make his new headquarters in Detroit, Mich.

John A. Allsup, Orland K. Noel, and John A. Halleran are new field representatives appointed by Clark Equipment Co. to meet growing needs of customers and dealers.

Mr. Allsup, formerly a sales representative with Nebraska Tractor & Equipment Co., will service the plain states

YOU CAN SEE WHAT MAKES ROEBLING MINE POWER FEEDER CABLE YOUR BEST BUY!

Tough, long-wear Roeprene® sheath wards off moisture, retards flame, resists oil, corrosion, abrasion. Meets flame-resistance requirements of Pennsylvania Dept. of Mines and carries symbol P-111.

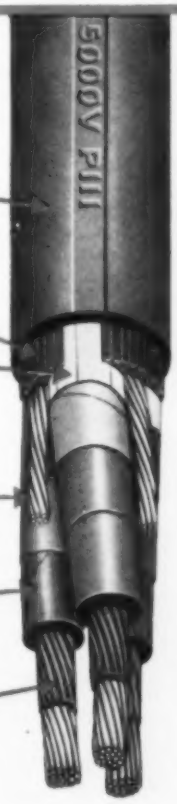
All-rubber fillers for moisture resistance, splicing ease.

Tin-copper shield tape for added safety of operation.

Adequate ground wires, in contact with conductor shielding. Grounds equal more than 90% of circular mil area of single power conductor, for complete grounding and fault return.

Butyl insulation for heat-, moisture-, ozone-resistance. Rated at 90° C copper temperature through 5000 v; 85° C through 15000 v.

Semi-conducting tape around each conductor prevents excessive voltage stress and ionization between conductor and insulation.



These are features that add up to longer, better, more economical service. Even at peak loading, rugged Roebling Mine Power Feeder Cable gives peak performance!

Pride of workmanship, special design features and finest raw materials make the difference. But don't take our word for it. See for yourself. Let us show you samples and give you recommendations and details as they apply to your application. Write to Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

STOP
material waste
REDUCE
handling costs
IMPROVE
product quality

with a
designed-to-
your-need

Marietta

storage system

Why put up with costly, inefficient coal storage and handling?

Let Marietta design and erect an efficient and economical storage system for your needs. Marietta concrete silos are quickly constructed without weather or material delays. Precast solid or lightweight air-cell concrete staves interlock to form an air-tight wall that keeps material stored fresh and dry . . . safe from weather or fire damage.

Marietta concrete silos provide years of service with minimum maintenance . . . save money through reduced insurance costs.

Any type of mechanical or pneumatic conveyors, feeders or discharge systems can be safely mounted on top or on the sidewalls of Marietta silos. Consult with Marietta now for the best answer to your particular storage problems . . . benefit by their more than 40 years "Know-how" in precast concrete and industrial storage systems.

Write now for a copy of the Marietta Industrial Storage Systems Booklet. Full cooperation extended to your own engineering staff, consultants and contractors.

The MARIETTA CONCRETE CORP.
MARIETTA, OHIO

BRANCH OFFICES: 501 Fifth Ave., New York 17, New York

BRANCH PLANTS: Baltimore 21, Md., Charlotte 6, N.C., Nashville, Tenn., Jamestown, N.Y.

Manufacturers (*Continued*)

area. Mr. Noel, a contractor since 1946, will work in the southeast and Mr. Halleran, previously a construction superintendent, will handle the northwestern part of the country.

Thomas W. Hunter has been named general superintendent of Gary Steel Works of United States Steel Corp.

Mr. Hunter goes to Gary from Pittsburgh where he has been assistant to vice president with duties concerned with the short and long range planning for all mining and manufacturing facilities of the corporation on a nationwide basis.

F. B. Steele was chosen as district manager in Chicago, Ill., for the industrial division of Gould-National Batteries, Inc.

Mr. Steel will direct Gould's field engineering service and a staff of sales personnel to assist industrial battery users in all phases of application, charging and maintenance.

E. George Hartmann has been elected vice president-sales of John A. Roebling's Sons Corp.

Prior to his appointment with Roebling, a wire and wire products manufacturer, Mr. Hartmann was general product manager of the Wire & Cold Rolled Products Div. of the Roebling Corp.

C. B. Smith has been promoted from manager of the service section to director of service, Industries Group, for Allis-Chalmers.

Mr. Smith, who has been with the organization since 1914 became manager of the service section in 1951. In his new post he will be responsible for service policies and co-ordination of service in the Industries Group.

Russell F. Johnson is the new field assistant to the general sales manager of Island Creek Coal Sales Co.

Since joining Island Creek in 1954 Mr. Johnson has been a territorial sales representative and assistant supervisor of Northern Agency Coals.

Joseph I. Andreini has been appointed manager of manufacturing by Bucyrus-Erie Co., and will direct manufacturing operations for the firm's plants in South Milwaukee, Wis.; Erie, Pa.; Chicago, Ill., and Evansville, Ind.

Mr. Andreini comes to Bucyrus-Erie from the Borg-Warner Corp., where he was vice president of operations of the Pesco Products Div., Bedford, Ohio.

Gerald C. Nalon has been appointed sales representative for the Mining Sales

NEW FOR YOUR CONVENIENCE...

FLEXCO "25-PAK"

TWENTY-FIVE COMPLETE SETS OF FLEXCO HD BELT FASTENERS NOW AVAILABLE IN ONE EASY-TO-HANDLE ECONOMY BULK PACKAGE

There's no need now to carry several 10-set boxes to the job—every "25-PAK" contains 25 complete sets of FLEXCO Fasteners (bottom plates, top plates, clips, nuts and bolts) . . . enough FLEXCO Fasteners to join common belt widths (for example: one "25-PAK" box, size 1½E, will join a 36" belt.) Our savings from bulk-packaging are passed on to you!

Label on each "25-PAK" box has chart indicating the number of FLEXCO HD Fasteners to use for given belt widths.

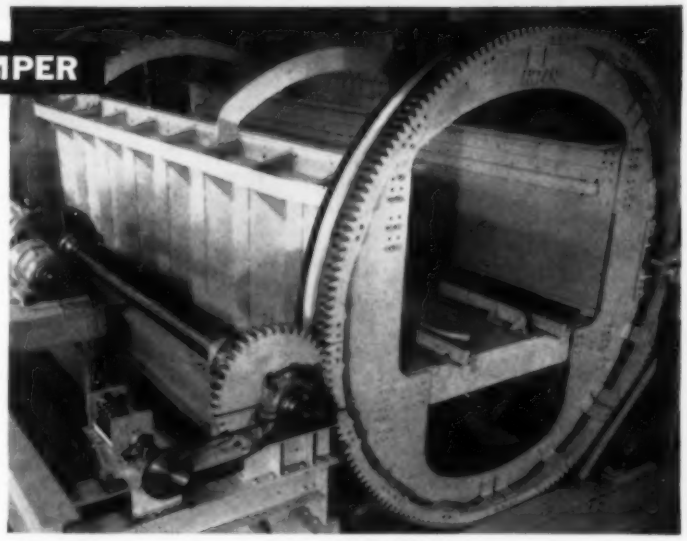
Standard shipping carton contains four "25-PAK" boxes of one size fastener. Keep a supply of "25-PAKS" on hand. Easy to store and inventory, sturdy boxes and shipping cartons have many uses.

Ask your FLEXCO distributor or write to us for additional information.

Flexible
STEEL LACING COMPANY
4638 LEXINGTON ST. • CHICAGO 44, ILL.
FOR THE SPLICE OF A LIFETIME

THE NOLAN PROFIT-PAIR
to meet modern mining requirements

NOLAN ROTARY CAR DUMPER



The newest, safest design in high-speed dumping through full 360° arc. Fully automatic with selective manual control. The result of 50 years of Nolan experience and progress in mine car dumping and control equipment.

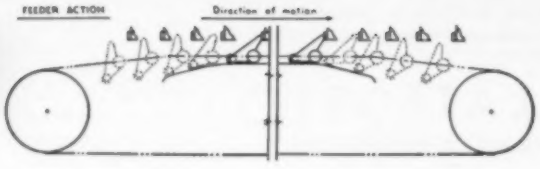
FEATURES:

—Designed for Today's High Capacity Mine Car
—Gear Driven through Flame Hardened Gears
—Complete with Base Frame, Dump Sheets, and Liner Plates
—Anti-friction Bearings Throughout
—Wide Faced Dump Rings of Special Alloy Steel
—Equipped with Nolan Patented Cushioned Rail Aligning Stop

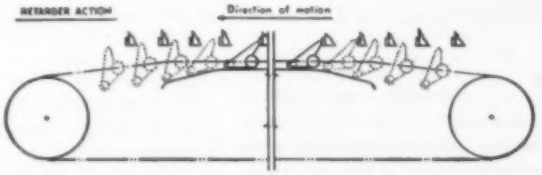
NOLAN CUSHION-ACTION TRIP FEEDER-RETARDER

The NOLAN Cushion-Action Feeder-Retarder makes possible the easy, accurate control of mine cars . . . and eliminates the wracking, jolting, inflexible action so common in ordinary chain control types.

Through the ingenious design of dogs, rails and chain, the feeding and retarding of mine cars becomes an easy, gentle, positive action. The diagrams at the right picture the Cushion-Action of this new NOLAN advancement, available only through NOLAN. Consult us for adaptation of the new NOLAN Cushion-Action principle to your particular feeder-retarder problems.



Feeder dog is pivoted on pin carrying outboard rollers of chain. Tail of dog has roller. Third track under center of chain governs position of dog with relation to vertical. Note difference in angle between chain track and dog track. As dogs progress along their track, they gradually assume an upright position and engage their respective pusher pads. At other end of frame, dogs ***gradually*** drop away from their pads. No straining, jolting or jarring as dogs engage and disengage.



Retarder dogs operate on same principle as feeder dogs and are situated adjacent to them. Gradually assume upright position and engage their respective retarder pads, holding back cars firmly and steadily. At end of chain, retarder dogs ***gradually*** drop away from their pads, without snapping or wracking of cars.

NOLAN AGENTS:

Huntington Supply & Equipment Co.
Huntington Nat'l Bank Building
Huntington, West Virginia

John Lloyd & Sons
33 Bennett Building
Wilkes-Barre, Pennsylvania

E. C. Horne Machinery Company
1726 Champa Street
Denver 2, Colorado

George C. Hutchinson, Jr.
1304 Koonan Building
Pittsburgh, Pennsylvania

Frank C. Hemmott
P. O. Box 154
Castle Gate, Utah

Amos A. Culp
429 South 24th Street
Birmingham 5, Alabama

John North Associates
P.O. Box 105
Harbert, Michigan
(Chicago District)

THE NOLAN COMPANY
BOWERSTON, OHIO

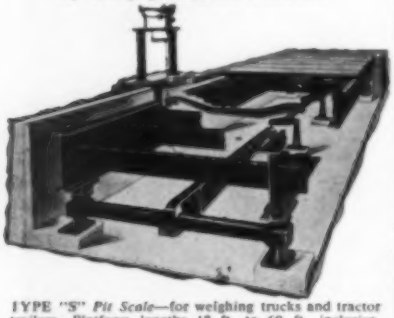
NOLAN

WINSLOW

Dependable — Accurate

TRUCK and TRACTOR TRAILER SCALES

TYPE "C. S." *Portable Scale*—easily and quickly set up—with preparation held to minimum



TYPE "S" *Pit Scale*—for weighing trucks and tractor trailers—Platform lengths 18 ft. to 60 ft. inclusive.

WINSLOW SCALE COMPANY

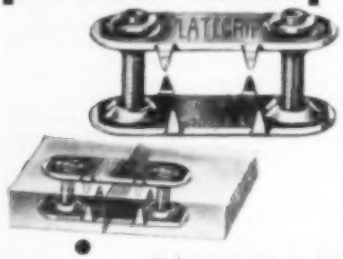
TERRE HAUTE 1, INDIANA

Phone for more details, North 6515

Scale Manufacturers since 1896

PLATEGRIP

PLATE FASTENERS FOR CONVEYOR BELTS



Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from 1/4" to 1 1/2" thickness. *Write for Catalog Sheet.*

ARMSTRONG BRAY & CO.

5340 Northwest Highway, CHICAGO 30, U. S. A.

Manufacturers *(Continued)*

Section of Metallurgical Products Dept. of General Electric Co.

Mr. Nalon joined General Electric in 1950, worked in the chemical and metallurgical training program and later was assigned to the engineering section with responsibilities for grade development in the non-ferrous machining and mining fields.

William C. Kurtz has been appointed manager of truck-tire sales for General Tire & Rubber Co.'s Detroit Sales Div.

Mr. Kurtz joined General Tire in 1952. A native of Paris, Ill., he attended the University of Illinois. He has been engaged in rubber industry sales work for 22 yr.

H. W. Dow, Jr., has been selected as manager, New York District Office, Engine Div., Nordberg Mfg. Co.

Mr. Dow was born in Rockford, Ill., and following his early education, studied engineering at the University of Wisconsin. He joined Nordberg as a production engineer in 1943 and entered sales engineering in 1945. Since 1955, Mr. Dow has been a special representative of the Engine Div. in the New York office.

J. Frank Forster is the new president of Vickers, Inc.

His appointment to the board of directors has also been made known. Mr. Forster came to Vickers as treasurer in 1941 and was made vice president and assistant general manager in 1949; early last year he became executive vice president. Prior to joining Vickers, he was production planning manager for the Sperry Gyroscope Co.

John A. Wettergreen has been named manufacturing vice president and general works manager of Marion Power Shovel Co., a division of Universal Marion Corp.

A civil engineering graduate of the University of New Hampshire, Mr. Wettergreen took graduate work in metallurgy at the University of Wisconsin. His manufacturing experience includes six years with General Electric Co., and the last 21 yr with Bucyrus-Erie Co.

Edward O. Breunig has been promoted to truck tire sales manager for General Tire & Rubber Co.'s Los Angeles division.

In his new post, Mr. Breunig will have responsibility for direction of truck-tire sales in southern California and parts of Arizona and Nevada. He studied at Woodbury College and served 22 mo in the U. S. Navy.

Sheldon P. Wimpfen has joined Western Machinery Co. as general manager of the Planning, Research, and Development Dept.

Mr. Wimpfen, in addition to back-

Here's How... to make a PROFIT from COAL FINES

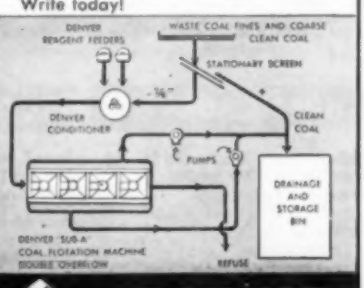
with DENVER "Sub-A" COAL FLOTATION

Simple...Low Cost!

You can handle coarse coal (—⅛"x0") at the head of your circuit in DENVER "Sub-A" Flotation Machine. You save coarse as well as fines in a coal product which is easily dewatered! You have simple, low-cost system.

Over 90% of all coal flotation plants in U. S. are Denver "Sub-A", an outstanding testimonial to DECO's experience, engineering "know-how" and equipment.

DECO can provide complete testing, engineering service, flow-sheet design and all equipment for your coal flotation plant. One source of supply, one responsibility. Write today!



DENVER EQUIPMENT CO.

1400 Seventeenth St. Denver 17, Colorado

water-proofing winter-proofing

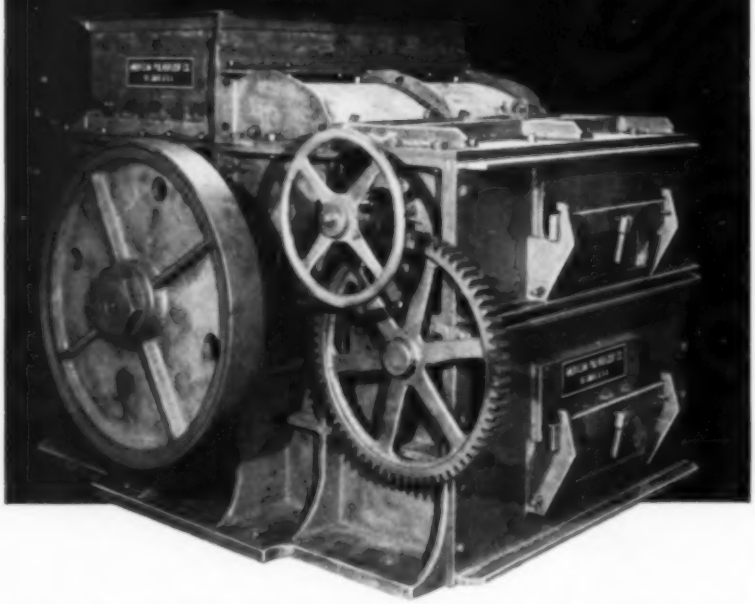
Ashland Permatreat Coal Spray Oil — *Lasts the life of the coal!*

- **DECREASE WATER ABSORPTION**—Permatreated coal repels water.
- **FREEZE PROOF**—Permatreated coal resists freezing and eliminates frozen car pockets.
- **REDUCE MOISTURE**—Less moisture, less freezing, higher BTU's.
- **DUST PROOF—ODORLESS**—Permatreated coal insures dustless deliveries and handling, odorless storage and burning.
- **ELIMINATE WINDAGE LOSS**—that results in lost weight claims and air pollution complaints.
- **AVOID CORROSION** — Non-corrosive Permatreat can't pit or corrode stoker equipment, or rolling stock.
- **MAINTAIN QUALITY** — Permatreat reduces deterioration from weathering.
- **CONTROL BULK DENSITY**—Permatreat insures uniform coke production and quality.
- **SPECIAL ADVISORY SERVICE**—Available from nationally recognized authorities on coal treating.

ASHLAND OIL & REFINING COMPANY
Ashland, Kentucky

Ashland
PERMATREAT

American Coal Crushers are RUGGED!



Soundly engineered and constructed to give you many years of high volume crushing at low operating costs.

1. Oversize bearings.
2. Alloy Steel heat treated rotor shaft.
3. Heavy rib reinforced housing with renewable liners and tramp metal pocket.
4. Manganese Steel crushing elements.
5. Exclusive American-Originated rolling shedder ring which splits coal instead of crushing it.
6. More efficient crushing design which permits slower operating speeds and less power consumption per ton of coal crushed.
7. Dual adjustment to give flexibility of size control and to compensate for wear.
8. Maximum flexibility of rolling ring rotor prevents injury from tramp iron.
9. Full width screening area gives faster discharge of reduced product.

Coal Crushers exclusively, from Sample Crushers to Capacities of 800 TPH
Write for literature stating capacity you need.

American PULVERIZER COMPANY
ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS
1119 MACKLIND SAINT LOUIS 10, MISSOURI

Manufacturers (*Continued*)

ground with the Atomic Energy Commission, has served as vice president of Glen Alden Corp., and as Editor of the Mining Congress Journal in Washington, D. C.

Leanard Z. Budzen has been made manager of mining sales in the Metallurgical Products Dept. of General Electric Co.

Mr. Budzen was educated at the University of Michigan, where he received a degree in industrial and mechanical engineering. He joined the firm in 1941 and has been a mining sales representative in Pittsburgh, as well as a mining sales specialist during 1956.

Mr. Lyle W. Stewart, treasurer, and Mr. Robert C. Woodhead, consulting engineer, for McNally Pittsburg Mfg. Corp., departed from New York City on a round-the-world flight that will take them to Turkey.

There two contracts have been received for coal preparation facilities. One of the new plants will be located at Armutcuk while the other will be built at Tuncbilek.

Richard P. Gifford has been named manager of engineering for General Electric Co.'s Communication Products Dept.

In his new position, Mr. Gifford will head a section comprised of more than 200 engineers and technicians engaged in design and development of both commercial communications devices and products for governmental and military services.

William C. Ridge has been elected vice president-production of John A. Roebling's Sons Corp.

The firm is a nationally-known manufacturer of wire and wire products. Mr. Ridge has had 15 yr of experience with Roebling. Prior to his appointment he was works manager of the corporation and before that manufacturing manager of the Electrical Wire Div.

Fred W. Elliott has been elected a vice president of H. K. Porter Co., Inc.

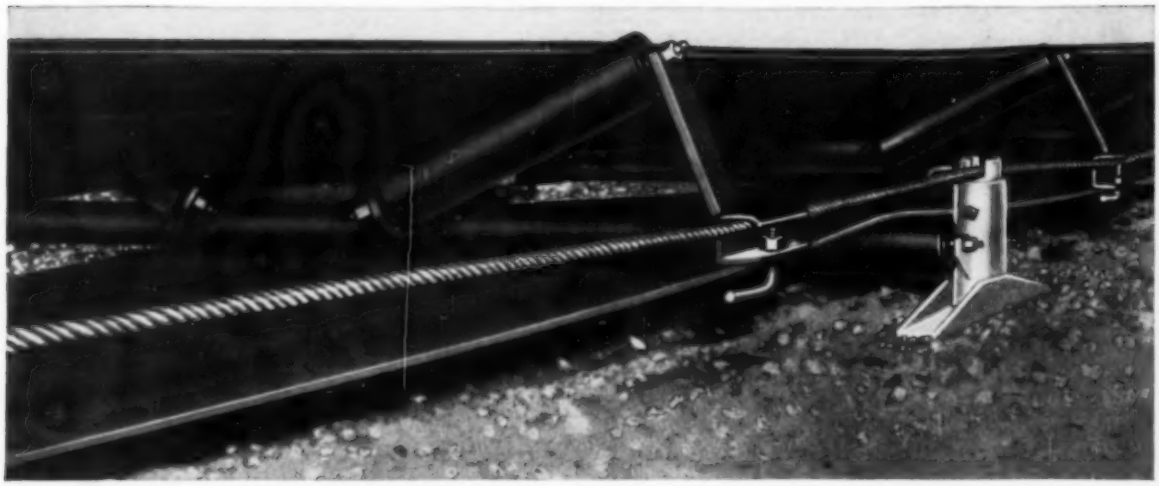
He joined Porter in 1956, coming from the Pennsylvania Industrial Corp., prior to that he had been with Batelle Memorial Institute, Columbus, Ohio. Mr. Elliott is a graduate engineer from the University of Pittsburgh and received his M.S. from Ohio State.

Roscoe J. Blanton and Ralph A. Varel have been appointed vice-presidents of Varel Mfg. Co., it was recently announced at a meeting of directors.

Mr. Blanton, formerly plant superintendent, has been with the firm since 1947 and Mr. Varel, formerly production manager, has been there since 1948.

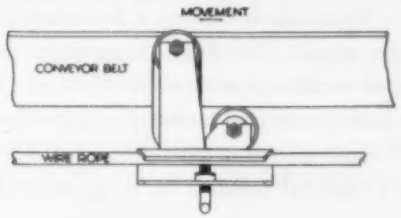
An Important New Development...

The LONG Lo-Rope BELT CONVEYOR



- **Automatic Self-Training** is provided since idlers rock in direction of belt travel.
- **Greater Safety** results as there are no side obstructions at level of carrying belt. Handling men and supplies is safe and easy.
- **Adjustable Height** rope supports minimize blocking—permit belt leveling in undulating bottom. Height adjustments for all seam thicknesses.
- **Greater head room for handling men in thin seams.** Carrying surface of belt may be as low as 9″ from bottom.
- **Deep Trough design** reduces spillage and permits wider spacing between idlers.
- **Simpler, easier installation.** New type anchors have built-in tensioning device with quick acting rope clamps that permit use of continuous rope.
- **Overlapping rolls** eliminate possibility of belt edge contact with inside end of troughing rolls.

Lo-Rope Idler Assembly (Patent Applied For)



SELF-TRAINING...BOTH DIRECTIONS

The Lo-Rope troughing rolls and carrying belt are entirely above the rope side frame—any tipping movement of the troughing rolls is in the direction of belt travel. This gives a well-established, self-training effect *automatically* in *both* directions of travel.

This feature—the rocking movement on the rope as opposed to swinging—is an entirely new principle that offers important advantages not previously available.

For full information on LONG Lo-Rope Belt Conveyors or a demonstration, write us today

The LONG Company
Oak Hill, W. Va.

The industry's foremost specialists in conveyor mining machinery.

AKINS SEPARATOR

makes 3-product separation in coal cleaning plant

This coal cleaning plant, as all prefabricated Sweco Heavy Media plants, is designed by the Southwestern Engineering Co. for the use of an Akins Heavy Media Separator, which is successfully making a 3-product separation with only one media cleaning circuit, using an Akins Heavy Media Densifier.

PRODUCES 2 GRADES OF COAL

This Akins Separator is making a 3-product separation, requiring only one media circuit. The Akins Separator, permitting extraction and blending of middlings with either float or sink, makes it possible to improve both grade and recovery and produce two types of coal from the same seam... one a high grade for domestic and industrial uses and one a high-ash product for large steam plants.

PROVED ADVANTAGES OF AKINS SEPARATORS

• 3-product separation in one machine, requiring only one media circuit • Start-up under full load • Entire vessel is visible and accessible • Variation in rate or grade of feed is not detrimental • Large pool area and volume minimize tramp refuse in the product and facilitate better recovery of values from fine sizes • Gradation of gravity and viscosity from feed entry point to sink removal point provides natural cleaning of sink, and allows circulation of media at lower gravity and viscosity.

WRITE FOR NEW AKINS SEPARATOR MANUAL 56

Akins—the ORIGINAL spiral type classifier.

COLORADO IRON WORKS CO.

3800 Race Street • Denver 2, Colorado

AKINS CLASSIFIERS • SKINNER ROASTERS • LOWDEN DRYERS

Sales Agents and Licensed Manufacturers in Foreign Countries

A SUBSIDIARY OF THE MINE & SMELTER SUPPLY CO

Equipment Approvals

Twelve approvals were issued during December.

Goodman Mfg. Co.—Type 2400 cutting machine; two motors, one 60 hp and one 35 hp, 500 V, 50 cycles, AC. Approval 2-1315A, Dec. 10.

Joy Mfg. Co.—Type 15BU-1BE loader; seven motors, one 4 hp and six 15 hp, 250 V, DC. Approval 2-1316, Dec. 11.

Acme Machinery Co. — Model 275A4-JS compressor; one motor, 75 hp, 230 V, DC. Approval 2-1317, Dec. 11.

Joy Mfg. Co.—Type MAC-2E portable air cleaner; one motor, 30 hp, 250 V, DC. Approval 2-1318, Dec 12.

The Jeffrey Mfg. Co. — Type MT90CR shuttle car; three motors, three 15 hp or two 15 hp and one 10 hp or three 10 hp, 250 or 500 V, DC. Approvals 2-1319 and 2 1319A, Dec. 17 and Dec 31 respectively.

The Long Co.—Model 188C swing-boom loader; one motor, 40 hp, 220/440 V, AC. Approvals 2-1320 and 2-1320A, Dec. 18.

Joy Mfg. Co.—Type 5CM-1AN miner; five motors, two 100 hp, two 15 hp and one 30 hp, 500 V, 50 cycles, AC. Approval 2-1321A, Dec. 23.

Joy Mfg. Co.—Type 1CM-3CE continuous miner; seven motors, two 100 hp, two 7½ hp, two 10 hp and one 15 hp, 250 V, DC. Approval 2-1322, Dec. 30.

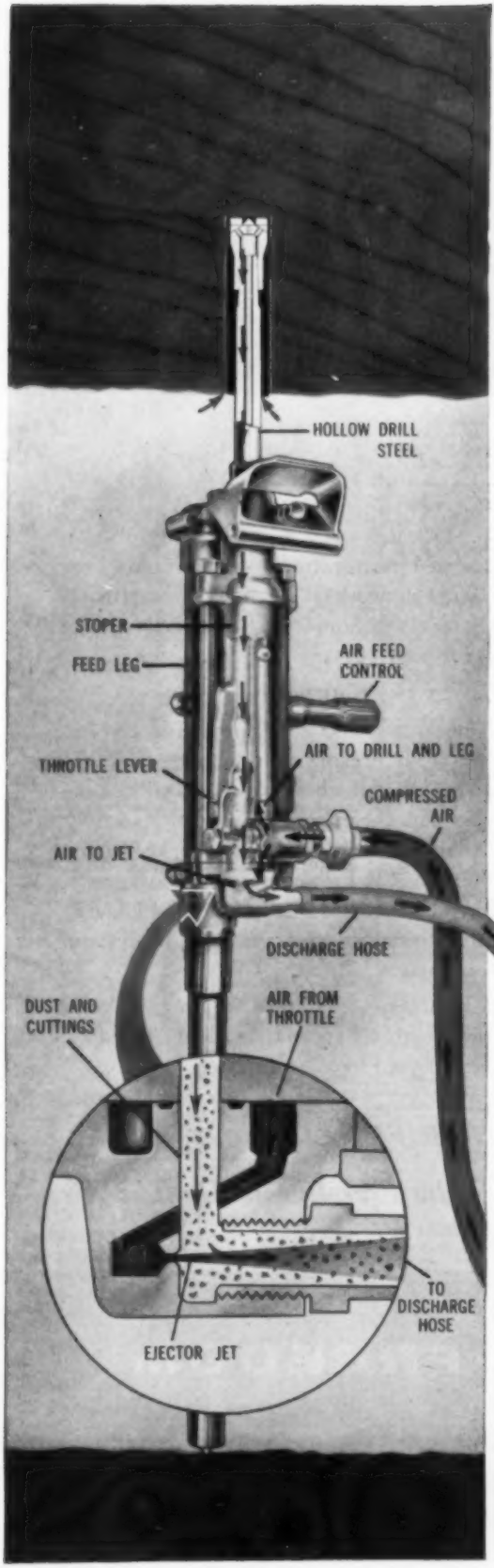
National Mine Service Co.—Torkar 3C shuttle car; one motor, 15 hp, 250 V, DC. Approval 2 1323, Dec. 30.

National Mine Service Co.—Type 60ED Torkar, diesel shuttle car for use in non-coal mines. Approval 2414, Dec. 13.

Coming in *Coal Age* . . .

Intelligent layout of a power system for efficient deep mining; care and maintenance of induction motors; better public relations for coal; auxiliary ventilation underground; design of safe gas-well pillar. . . .

These are subjects of feature articles to be published in the March issue of **Coal Age** along with a number of other idea starters.



Only the Ingersoll-Rand

VACUJET

DUSTLESS STOPER

offers all these cost-saving advantages for roof bolting

Designed from the ground up for dry dustless drilling, with built-in jet vacuum and pressure discharge, the Ingersoll-Rand RP38E VACUJET dustless stoper is setting entirely new standards of performance and economy. Here's why:

Strongest Suction Power — vacuum is produced, right in the drill itself — not 25' away. Will even remove cuttings on horizontal holes!

Dust Discharged Under Pressure—no costly vacuum hose required. Ordinary 1" air hose carries dust up to 25 ft. away from drill.

Low-Cost Dust Collector — a simple filter and receptacle is all that's required. Even a canvas bag will do.

Quieter Operation — there is no unnecessary ear-splitting whine or howl in the dust collection system.

Highest Drilling Speed — because stronger suction and ample ports assure non-clogging operation.

Lower Bit-Shop Costs — tapered bit end and plain shanked drill steels eliminate need for furnaces, threading and forging equipment.

There's no other stoper like it!

For complete information, send today for a copy of Bulletin No. 4195.

Ingersoll-Rand

5-707 ♥ 11 Broadway, New York 4, N. Y.

COMPRESSORS • CARSET BITS • ALLOY RODS • HYDRA-BOOM JUMBOS
HOSE • JACKDRILLS • IMPACTOOLS

How your truth dollars help keep the Reds in the red

• The truth dollars you give to Radio Free Europe help keep truth on the air behind the Iron Curtain.

And the truth is an enormously disruptive force to the Reds. For it keeps their captive people thinking . . . wondering . . . and less than completely dominated. The truth keeps needling the Reds. Breaks through their monopoly of lies. Keeps them unsure. Off balance. And thus the truth keeps up to forty fully armed Red divisions tied up policing Russia's satellite countries. Forty divisions, mind you, that might otherwise be put to more aggressive use elsewhere . . . and who knows where?

Your truth dollars keep the 29 super-powered transmitters of the Radio Free Europe network on the air . . . broadcasting the truth behind the Iron Curtain . . . every hour of every day.

Why *your* truth dollars?

Because Radio Free Europe is a private, non-profit organization supported by the voluntary contributions of American business and the American people. And *your* dollars are urgently needed to keep it on the air . . . to help operate its transmitters, pay for its equipment and supplies, and its scores of announcers and news analysts in 5 languages.

Help keep the Reds in the red. Send your truth dollars to Crusade for Freedom, care of your local postmaster.

FREEDOM IS NOT FREE!

Your Dollars Are Needed To Keep Radio Free Europe On The Air

SEND YOUR TRUTH DOLLARS TO

CRUSADE for FREEDOM

CARE OF YOUR LOCAL POSTMASTER

PUBLIC SERVICE ADVERTISING COUNCIL

he's working for you

THIS FELLOW IS TRAINED IN YOUR BUSINESS. His main duty is to travel the country — and world — penetrating the plants, laboratories and management councils . . . reporting back to you every significant innovation in technology, selling tactics, management strategy. He functions as your all-seeing, all-hearing, all-reporting business communications system.

THE MAN WE MEAN IS A COMPOSITE of the editorial staff of this magazine. For, obviously, no one individual could ever accomplish such a vast business news job. It's the result of many qualified men of diversified and specialized talents.

AND, THERE'S ANOTHER SIDE TO THIS "COMPOSITE MAN," another complete news service which complements the editorial section of this magazine — the advertising pages. It's been said that in a business publication the editorial pages tell "how they do it" — "they" being all the industry's front line of innovators and improvers—and the advertising pages tell "with what." Each issue unfolds an industrial exposition before you — giving a ready panorama of up-to-date tools, materials, equipment.

SUCH A "MAN" IS ON YOUR PAYROLL. Be sure to "listen" regularly and carefully to the practical business information he gathers.

McGRAW-HILL PUBLICATIONS

PROFESSIONAL SERVICES

NEWELL G. ALFORD
Consulting Mining Engineer
Coal Property Prospecting
Development, Operation and Valuation
Oliver Building — Pittsburgh 22, Pa.

ALLEN & GARCIA COMPANY
46 Years' Service to the
Coal and Salt Industries and Consultants
Construction Engineers and Managers
Authoritative Reports and Appraisals
332 S. Michigan Ave., Chicago
120 Wall Street, New York City

AMERICAN AIR SURVEYS, INC.
Registered Engineers
TOPOGRAPHIC MAPS FOR MINING
AERIAL PHOTOGRAPHS
907 Penn Ave., Pittsburgh 22, Pa.
Phone EXpress 1-3969

GEO. S. BATON & COMPANY
"Founded 1900"
Consulting Engineers
Cost Analysis — Valuations
Mine and Preparation Plant Designs
1100 Union Trust Building — Pittsburgh 19, Pa.

JOHN J. BORDERS
Mine Roof Support Consultants
Construction Co.
Roof Bolting — Time Study
Modern Production Methods Analysis
Concrete Construction & Design
Foreign and Domestic
Pana, Illinois

COAL STANDARDS, INC.
Methods & Management Consultants
MAMMOTH, W. VA.
J. P. Morgan, President — Telephones
L. J. Preiss, Secretary — East Bank 3311
R. E. Olson, Treasurer — East Bank 6401

EAVENSON, AUCHMUTY & GREENWALD
Mining Engineers
COAL OPERATION CONSULTANTS
VALUATIONS
2720 Koppers Bldg. — Pittsburgh 19, Pa.

THERON G. GEROW
Mining Consultant and Engineer
3033 Excelsior Blvd. — Minneapolis 16, Minnesota

NOW,
more than ever before,
the coal industry should take advantage of the opportunity to use the broad experience and knowledge of the consultant and profit by such use.

HOFFMAN BROS. DRILLING CO.
Drill Contractors Since 1902
Specialists in exploratory—grout hole and pressure groutings. Rigs located in over 50 strategic areas for prompt service. Free estimates.
104 Cedar St. — Punxsutawney, Penna.

KIRK & COWIN
Ralph E. Kirk — Perry G. Cowin
Registered Professional Engineers
Consulting—Reports—Appraisals
Mechanical Mining of Ore & Coal
Management and Construction of Mines
1—18th St., SW—Birmingham, Ala.
Phone 56-5566

HERBERT S. LITTLEWOOD
Consulting Electrical Engineer
Evergreen Hills — Irwin, R.D. #3, Penna.

J. B. MORROW
Coal Consultant
Oliver Building — Pittsburgh, Pa.

K. PRINS AND ASSOCIATES
Engineers and Consultants
Coal Preparation-Layouts
and Construction Designs
Wellston, Ohio phones 4-3355-4-2393

DAVIS READ
Consulting Engineer
Layout — Operation
Modern Production Methods
Plant Design — Preparation
120 S. La Salle St. — Chicago 3, Ill.

ROBINSON & ROBINSON
Consulting Engineers
Mine Operation — Preparation
Coal Property Valuation
Industrial Engineering
Union Bldg. — Charlestown, W. Va.

J. W. WOOMER & ASSOCIATES
Consulting Mining Engineers
Modern Mines Systems and Designs
Foreign and Domestic Mining Reports
Oliver Building—Mellon Square, Pittsburgh, Penna.

PAUL WEIR COMPANY
Established 1936
Mining Engineers & Geologists
DESIGN AND CONSTRUCTION
20 North Wacker Drive — Chicago 6, Illinois

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

COMPRESSORS
2—985 CFM Ingersoll-Rand Imperial Type Compressors 18" & 10" x 14", complete with motor and drive.
1—1372 CFM Ingersoll-Rand Imperial Type Compressor 21" & 12" x 16", with 200 HP motor and drive.

COAL CRUSHERS
1—24" x 24" Jeffrey Single Roll
1—18" x 18" Jeffrey Single Roll

COAL CUTTERS
5—Goodman type 112 shortwall, A.C.
1—Sullivan type 7B super-shortwall, A.C.
3—Sullivan type 7B super-shortwall, D.C.
6—Sullivan type CE-7, A.C.
1—Jeffrey type 28-A, A.C.

SHAKER CONVEYORS
7—Goodman type G-20
6—Goodman type G-15
1—Joy type UN-17
4—Vulcan type 25/30

BATTERY LOCOMOTIVES
1—1½ ton General Electric Trammer, 18" gauge
2—1½-2 ton Mancha Trammers, 18" gauge
3—3½-4 ton Mancha, 24" ga.
1—4 ton Westinghouse, 24" ga.
1—4 ton Ironton 36" ga.
2—6 ton General Electric 36" ga.
2—7 ton General Electric, 36" ga.
1—7 ton Atlas—36" ga.
3—8 ton Ironton, 36" ga.
2—8 ton General Electric, 36" ga.
2—8 ton Goodman, 36" ga.
4—10 ton Atlas, 36" ga.

TROLLEY LOCOMOTIVES
1—2 ton Atlas, 18" gauge
1—4 ton General Electric, 18" gauge
2—6 ton Jeffrey, 18" gauge
1—6 ton Goodman, 18" gauge
2—10 T. Jeffrey 42" ga.
1—13 T. Goodman, 42" ga.
1—13 Jeffrey, 42" ga.
1—15 T. Jeffrey, 42" ga.

SHUTTLE CARS
1—Joy model 6DD3P, battery operated
7—Joy model 6DD1, battery operated

MINE FANS
1—120" Joy La-Del axial flow fan, model L-14
1—7' Jeffrey aerodyne 2 stage fan

HOISTS
2—125-250 H.P. Ottumwa Single Drum
1—250 H.P. Ottumwa Single Drum and many other hoists in stock, single and double drum, 10 H.P. to 250 H.P.

SINCE 1898 DEALERS IN DEPENDABLE RECONDITIONED MINING MACHINERY OF ALL TYPES

MORSE BROS. MACHINERY COMPANY
2900 Brighton Blvd., Denver, Colorado

FOR SALE
MINING EQUIPMENT

That includes 5—10 ton 36" gauge 250 volt locomotives; 250—36" ga. 1½ ton Timken bearing mine cars; 40 sets of 33" ga. Timken bearing mine car trucks that were never used; 1—7B Sullavin cutting machine; 1—Electric hoist complete 4½' to 6' stepup drum with 400 H.P. motor; 1 electric hoist with 4' by 9' straight drum complete with 150 H.P. motor; 1—4' by 40' Marcus Screen Shaker complete.

PANTHER CREEK MINES, INC.
1301 N. Walnut St.
Phones 2-3112 or 2-5144
Springfield, Illinois

FOR SALE
CONVEYOR BELT
520 ft. 48" x 7 ply, Used Conveyor Belt—Excellent condition. No holes—No edge wear. Price $8.00 per foot.
Industrial Rubber Products Co.
815 Court St., Charleston, W. Va.

SHOVELS — DRAGS
CRANES
DRILLS — EUCLIDS

5150 Bucyrus Monighan Drag, 165', 9 yd.
7400 Marion Drag, 160', 13 yd.
625 Page Diesel Drag, 150', 10 yd.
621-S Page Diesel Drag, 135', 6 yd.
2400 Lima Dragline, 130', 5 yd.
4500 Manitowoc Drag, 120', 5 yd.
5-W Bucyrus Erie Drag, 120', 5 yd.
111-M Marion Drag, 100', 4 yd.
1055 P&H Dragline, 100', 3½ yd.
54-B Bucyrus Erie Drag, 80', 2½ yd.
170-B Bucyrus Erie 6½ yd. Elec. Shovel
2400 Lima 5½ yd. H. L. Shovel
120-B Bucyrus Erie 4 yd. Elec. Shovel
88-B Bucyrus Erie 4 yd. Standard Shovel
1201 Lima 2½ yd. H. L. Shovel
54-B Bucyrus Erie 2½ yd. Standard Shovel
3500 Manitowoc 2 yd. H. L. Shovel
Unit 1020 ¾ yd. Shovel
Also, various smaller Shovels & Drags
400 Reich Truck Mounted Rotary Air Drill
600 Reich Heavy Truck Mounted Rotary Air Drill
McCarthy Coal Recovery Auger Drill
Euclid Trucks—Rear & Bottom Dump
Dozers, Scrapers, Graders, Front End Loaders

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton Nat'l Bank Bldg.
Hazleton, Pa. GLadstone 5-3658

FOR SALE
MANITOWOC Model 3500
STRIPPING SHOVEL
With 35' boom, 27' stick, 2½ yd. dipper, powered by D-17000 Caterpillar Engine. Good Condition.
ANDERSON EQUIPMENT COMPANY
P. O. Box 427, Bridgeville, Pa.
Phone: CAnal 1-5300

FOR SALE
JEFFREY 76 A M COLMOL
Complete with Hydraulic controls; in excellent condition. Still at the mine.
WRITE • WIRE • PHONE: Mr. Rintell
Simpson Coal & Chemical Corp.
120 Wall Street, New York 5, N. Y.
Tel.: WHitehall 3-1600

5—DIESEL ELECT. LOCO. 25 to 65 TON
11—70' FLAT CARS
100—HOPPER CARS, 3600 CU. FT.
30—GONDOLA CARS—ALL STEEL
10—20 YD. AIR DUMP CARS
MISSOURI CAR & LOCOMOTIVE CO.
8465 Halls Ferry Rd., St. Louis, Mo.

BARGAINS
312 Goodman Mining Machine
200 & 75 KW Motor Generators
MOSS COAL & MINERAL CO.
705 N. 9th St.
Birmingham, Ala.

WANTED
COAL BRIQUETTING MACHINE
Carthage Coal Mines
Socorro, New Mexico

REPLIES (Box No.): Address to office nearest you c/o This publication Classified Adv. Div.
NEW YORK: P. O. Box 12 (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

SELLING OPPORTUNITY OFFERED

A company with several excellent products for the mining industry is looking for men with mining background to act as sales representatives. Good commissions paid and technical sales assistance is provided. SW-7169, Coal Age.

POSITIONS WANTED

Mine superintendent with twenty years experience in all phases of coal mining. Write P. O. Box 132, Charleston, W. Va.

Mining Engr.—age 31—Registered Engr., Certified Mine Foreman, 10 yrs. experience in design, development, and operation of coal mines. Desires responsible position in Engineering or Operations with an aggressive company. PW-6965, Coal Age.

Coal mine General Superintendent or Superintendent, 24 years experience in all types and phases of coal mining. Thoroughly experienced in mobile, track and belt mining. References on request. PW-7082, Coal Age.

BUSINESS OPPORTUNITIES

STRIP COAL WANTED
Lease or purchase—large or small tracts. Morgan Coal Company, 2850 North Meridian Street, Indianapolis 8, Indiana.

Wanted Coal stripping property, large acreage. Can strip and auger on deep mine outcrop. Coal can be sold by owner, if desired BO-6835, Coal Age.

WANTED

Anything within reason that is wanted in the field served by Coal Age can be quickly located through bringing it to the attention of thousands of men whose interest is assured be-this is the business paper they read.

DO YOU HAVE

an operating or idle coal mine for sale, large or small?

Or do you need financing for improving and/or increasing production?

Write particulars in full confidence to:

BO-6954 Coal Age
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

Proven **COST REDUCTION PROGRAMS**
for the Coal Industry
HELMICK & ASSOCIATES
9616 LAKE SHORE BLVD. CLEVELAND, OHIO

COAL STRIP WANTED
Complete with equipment, must be low down payment and reasonable terms. All details first letter, price, terms, haul, coal, cover, tipple, equipment etc.
ROLLING HILLS GEN. CONT. CO.
884 Edgewood Ave., Pittsburgh 34, Pa.

CUSTOMERS WANTED:
NO EXPERIENCE NECESSARY

Let us Show You How to Make Money by Taking Advantage of the Best Bargains ever in Mining Equipment. Largest Stock Anywhere.

WE OWN WHAT WE ADVERTISE

JOY EQUIPMENT—REBUILT

1—Joy 8AE Super 14BU Loader, rebuilt.
3—Joy 14-BU Loaders, low pedestal, 7AE.
2—Joy 14-BU Loaders, medium pedestal, 7RBE.
1—Joy 14-BU Loader, high pedestal, 7BE.
2—Joy 12-BU Loaders, 9E, latest type.
1—Joy 12-BU Loader 220/440 volt, 3 phase, AC rebuilt.
1—Joy 20-BU Loader, latest type.
1—Joy 11-BU Loader, latest type.
2—Joy 8-BU Loaders, 250 volt DC.
1—Joy 8-BU Loader, 34" overall height.
2—Joy 8-BU Loaders, 220 volt AC.
2—Joy curved Bar Heads, complete.
3—Reliance 38-J Motors, 10 H.P.
6—Reliance 24-J Motors, 7½ H.P.
5—Reliance 10-J Motors, 5 H.P.
20—9-J Motors, 4 H.P.
6—New Wheel Units for Joy 6 SC Shuttle Car.
1—Goodman 660 Loader on cats, excellent.
3—Goodman 665 Loaders on cats, latest type.
2—6SC Shuttle Cars, latest, low vein.
2—Joy 6 SC Shuttle Cars, rebuilt.
1—Joy 5 SC Shuttle Car, rebuilt.
2—Joy 32E9 Shuttle Cars.
2—Joy 32E10 Shuttle Cars, rebuilt.
2—Joy 32E15 Shuttle Cars, rebuilt.
1—Joy 32E16 Shuttle Car, rebuilt.
2—Joy 42E16 Shuttle Cars, rebuilt.
1—Joy T-2-5 low pan Cat Truck.
2—Joy T-2-6 low pan Cat Trucks with reel.
2—Joy T-1 Standard Cat Trucks, 220 AC.
1—Joy T-1 Standard Cat Truck, 250 DC.
2—Joy 11-B Cutting Machines, like new.
1—Joy 7-B Cutting Machine, like new.
3—Joy CD-22 Drills, like new.
2—Goodman 512 Machines, with Bugdusters.
1—Goodman Machine on Cats, 31" high. All hydraulic.
1—Goodman 512 cutting machine, perfect.
2—Goodman 512 cutting machines, 220 volt AC.
1—LeTourneau low vein Machine Carrier on rubber.
2—Jeffrey 70 URB's, rubber-tired Cutters, Universal head, perfect condition.
1—Joy 11RU, rubber tired Cutter with bugdusters, Universal head and dual tires.
3—Jeffrey 29UC Cutting Machines, Universal head, cuts anywhere in seam, 38" high, on cats, 250 volt DC.

LOCOMOTIVES

2—Jeffrey MH-2154's, 15 tons, perfect, 42" Ga.
2—Jeffrey 13 ton, type MH-110, 36" 42" and 44" Ga.
2—Jeffrey 10 ton, type MH-110, 42" and 44" Ga.
1—150 K.W. 6 phase, A.C. Rotary Converter, 275 V.
12—Jeffrey, 6 ton, type MH-88, 42", 44" and 48" Ga.
8—Jeffrey MH-78 Locomotive Units, cheap.
4—Jeffrey MH-88 Locomotive Units, real bargains.
6—Jeffrey MH-100 Locomotive Units, reasonable.
2—Jeffrey 8 ton, type MH-100, 2" armor plate frames.
1—Jeffrey, 6 ton, type 2186, 22" above rail.
3—Jeffrey, 4 ton, type MH-96, 42", 44" and 48" Ga.
1—G.E., 4 ton, type 825 Locomotive, 22" high.
10—G.E., 6 ton, types 801, 803, 821 Locomotives, 42", 44" and 48" Ga.
1—G.E., 8 ton, type 822 Locomotive, 44" Ga.
3—G.E., 10 ton, type 800 Locomotive, 42", 44" and 48" Ga.
1—Goodman, 4 ton, 8-30 Locomotive, 22" above rail.
2—Goodman, type 33, 6 ton, 44" and 48" Ga.
3—Goodman, 8 ton, type 32A, 36", 44" and 48" Ga.
3—Westinghouse, type 902, 4 ton, 42" and 48" Ga.
2—Westinghouse, type 904, 6 ton, 44" and 48" Ga.
2—Westinghouse, type 906, 44" and 48" Ga.
2—Westinghouse, type 907, 10 ton, 44" and 48" Ga.
2—Diesel Locomotives, 8 and 10 tons, Excellent.
Locomotive Trucks and Spare Armatures for all the above.

TIPPLE EQUIPMENT

1—Cedar Rapids portable super Screening Plant.
1—Allis-Chalmers 5' x 14' Ripple Vibrator.
1—5'x14' Robins double deck Vibrator.
1—4'x10' Robins Gyrex Vibrator.
1—McNally Pittsburgh all steel Tipple, four track perfect.
1—Complete five track tipple, all steel, with two compartment Jeffrey Washer.
1—Monzies tandem Hydro-Separator.
Belt Loading Booms.
1—Robins Car Shakeout.
10—Crushers, various sizes.
Feeders, Drag Conveyors and Loading Booms.

CUTTING MACHINES

2—Jeffrey 70 URB Cutters, rubber-tired, Universal Head, low vein.
3—Jeffrey 29UC Universal Machines on Cats.
1—Joy rubber-tired 11RU Cutter with bugdusters.
1—Goodman on cats, 31" overall height.
1—Baby Goodman 212, rebuilt, 250 volt DC.
1—Baby Goodman 212, rebuilt, 220 volt, 3 phase AC.
1—Goodman 312, 18" high.
2—Goodman 512's with Bugdusters, like new.
4—Goodman 512's, rebuilt, or as removed from service.
2—Joy 11B Cutting Machines, rebuilt.
2—Goodman 512 Cutting Machines, 220 volt AC.
6—Goodman 12AA's and 112AA's.
2—Goodman 324 Slabbers.
2—Goodman 724 Slabbers.
6—Jeffrey 35I's, like new, 17" high.
1—Jeffrey 35L, 220 volt, 3 phase AC, rebuilt.
2—Jeffrey 35L's, on low vein trucks.
15—Jeffrey 35B's and 35BB's.
2—Jeffrey 29B's on track.
2—Jeffrey 29C's track mounted.
1—Jeffrey 29L on track, perfect.
2—Sullivan CR-10's, 15" high.

LOADING MACHINES

16—Loaders, all types.
2—Jeffrey 61 CLR's on rubber, 26".
3—Jeffrey L-500 Loaders.
2—Myers Whaley No. 3 Automat Loaders.
2—Clarkson Loaders, 26" above rail.

CONVEYORS

2—Jeffrey 52-B, 30" Conveyors, 1500' each, Excellent.
4—Joy 30" Underground Belt Conveyors, 500' to 200' each, Excellent.
1—Barber Green 30" Belt Conveyor, 1000'. Excellent.
1—Robins 30" Belt Conveyor, 1000'.
2—Jeffrey 52-B, 26" Conveyors, 1200' each.
3000' Conveyor Belt, 30".
2—61EW Elevating Conveyors.
2—61WH 15" Room Conveyors, 300 ft.
2—Joy 15" Room Conveyors, 300'.
4—Joy 20" Chain Conveyors, 300'.
4—Joy Ladel UN-17 Shakers.
10—Goodman G-12½ and G-15 Shakers.
3—Long 400 DBH 15" Chain Conveyors, 25 H.P. Motors, new.

CONVERTERS AND DIESEL PLANTS

1—50KW, G.E. TC-6, 275 volt Rotary Converter.
2—100KW, G.E. TCC-6's, 275 volt Rotary Converters.
1—150KW, G.E. HCC-6, 275 volt, Rotary Converter.
1—150KW, 6 phase, Allis-Chalmers Rotary Converter, 275 volt DC, perfect.
1—200KW, G.E. HCC-6 Rotary Converter, 275 volt DC.
3—300KW, G.E. HCC-6 Rotary Converters, 275 DC.
3—300KW Westinghouse, 6 phase, Rotary Converters, 275 volt DC.

CONVERTERS AND DIESEL PLANTS (Cont.)

1—375KW Westinghouse Rotary Converter, 275 volt.
2—500KW Westinghouse Rotary Converters, 275 volt DC.
1—200KW Westinghouse Rotary Converter, 275 DC.
1—200KW Allis-Chalmers Rotary Converter, 6 phase, 275 DC, perfect.
(all the above with 6900/13000 and/or 2300/4000 primary transformers)
2—150KW MG Sets, General Electric and Westinghouse.
1—200KW MG Set, Westinghouse, rebuilt.
1—200KW MG Set, General Electric, perfect.
2—150KW Allis-Chalmers MG Sets, 275 DC volt, excellent, 220-440 AC volt.
1—300KW Westinghouse, 600 volt MG Set, rebuilt.
2—300KW Westinghouse, 600 volt, 6 phase, Rotary Converters.
4—500KW Westinghouse, 600 volt, DC, 6 phase, Rotary Converters.
1—500KW HCC-6 Rotary Converter, 6 phase, 600 volt DC.
1—Cummins 125 KW, Diesel with 250 volt DC Generator.
1—G.M.C. Diesel Plant with 60 KW Generator, 275 volt DC.
1—D-13,000 Caterpillar Diesel with 75 KW Generator, 275 volt DC.
1—Allis-Chalmers Natural Gas Engine with 100KW Generator, 275 volt DC.
1—700 H.P. Shaft Hoist, complete.
Complete steam plant, will sell all or any part.
Boilers like new, 1100 H. P. and 500 H. P. Also transformers, turbines, etc.
3—Complete, Tipples with Cleaning Plants, "2 all steel."

MISCELLANEOUS

Battery Supply Tractors, rubber tired.
1—Cantrell Air Compressor on rubber tires.
10—Air Compressors, 1 H.P. to 40 H.P.
1—Ingersoll Rand Air Compressor, 24" overall height on rail trucks.
40 Mine Pumps, all types.
1—Differential 40 Passenger Man-Trip Car.
6—MSA Rock Dusters.
1—American Mine Door Track Cleaner—new.
3—Philips Carriers.
2—Barber Greene self propelled Bucket Elevators.
Pipe, Plastic, Steel, Transit, all sizes 1" to 6".
45 Mine Cars, drop bottom, 42" Ga.
30 Mine Cars, drop bottom, 44" Ga.
100 Mine Cars, 18" high, end dump, 44" Ga.
90 Mine Cars, end dump, and drop bottom, 20" high, 48" Ga.
1—10 ton Mine Car Scale with Recorder.
1—150 ton Railroad Track Scale.
15—Brown Fayro HKL and HG Car Spotters.
1—12 ton Differential Slate Larry.
Incline Hoists, 25 to 50 H.P.
1—Joy 5' Aerodyne Fan.
1—Jeffrey 6' Aerodyne Fan.
1—Jeffrey 8' Aerodyne Fan.
1—Storage Tank, 8,000 Gallon.
2—Storage Tanks, 4000 Gallon.
1—Storage Tank, 12,000 Gallon.
10,000 Five Gallon G. I. Cans, screw lids.
800 tons Relaying Rail 25# to 80#.
10 tons Copper Trolley and 1000 MCM Feeder.
300 Transformers from 1 to 2,000 KVA, 110 to 13,000 primary volts.
400 Electric Motors, 3 to 250 H.P.
Large quantity 3/C rubber covered & underground cable.
Huge stock of mine supplies.

WE BUY • SELL • TRADE

SEND US YOUR INQUIRIES

PHONE 2825

J. T. FISH

THOUSANDS OF OTHER ITEMS

LOGAN, W. VA.

20# — 30# — 40#
NEW RAIL IN STOCK
LEFTON INDUSTRIAL CORP.
Genl. Office: 212 Victor St.
St. Louis 4, Mo.

LOCOMOTIVES
STORAGE BATTERY — TROLLEY
THE IRONTON ENGINE COMPANY
FARMINGDALE, NEW JERSEY
(Formerly Ironton, Ohio. 1902-1958)

NEW and REBUILT
STORAGE BATTERY
LOCOMOTIVES
1½ to 10 Tons 18" to 56½" Track Gauge.
GREENSBURG MACHINE CO.
Greensburg, Pa.

MODERN MINING EQUIPMENT FOR SALE

Call Us When Buying, Selling, Or Trading Mining Equipment—If It's In This Ad—It's On Our Yard

LOADING MACHINES FOR SALE

2—14BU-7BE Joy Loading Machines, 250 Volts D. C.
1—20BU-3E Joy Loading Machine, 250 Volts D.C.
1—18HR-1G Joy Loading Machine, 220/440 Volts A.C. Excellent Condition.
2—12BU-7E Joy Loading Machine, reconditioned
3—7BU Joy Loaders, 250 Volt D.C.
1—11BU Joy Loader, 250 Volt D.C.
2—8BU Joy Loaders, 250 V., D.C.
1—14BU-7RAE Joy Loading Machine.
1—14BU-7BE Joy Loading Machine
2—12BU-7H Joy Loading Machines, A.C. Excellent condition.

SHUTTLE CARS FOR SALE

6—6SC-5E Joy Shuttle Cars, 250 Volts D.C., elevating discharge, 4-wheel steering.
1—Jeffrey Shuttle Car, 4 wheel drive and steer, modern, rebuilt.
1—32E-9 Joy Shuttle Car, reconditioned.
2—6SC Joy Shuttle Cars, fixed elevated discharge, disc brakes, 34" high (Matched Pair).
1—5SC-8XE Permissible Joy Shuttle Car, equipped with disc brakes. Rebuilt.
2—42E-9 Joy Shuttle Cars, equipped with dual tires and cable. Excellent operating condition.

BELT CONVEYORS FOR SALE

2—Goodman type 99-5-AS36 Goodman Belt Conveyors, each 1200' long, driven by 20/40 H.P. Louis Allis permissible motors. Equipped with 4 ply, 42 oz. Goodyear conveyor belt.
1—Barber Green 36" belt conveyor, 1200' long, complete with 40 H.P. permissible drive, 4 ply, 42 oz. rubber belting

CHAIN CONVEYORS FOR SALE

3—5 H.P. Long Conveyors, 300 ft. long, complete with head, tail, pans and chains.
1—6I AM Jeffrey Chain Conveyor, complete with pans, chains, each 300' long. 10 & 15 H.P.
3—6I HG Jeffrey Face Conveyors, complete.
1—PT15 Long Piggy Back Conveyor, complete with self-propelled conveyor heads, pans, and chains, 250 V. DC, permissible. Excellent condition. Can be furnished with or without 14BU-7RAE, 250 volt DC loading machines.
4—10 H.P. Long Conveyors, 300 ft. long complete with head, tail, pans & chains.

HOISTS FOR SALE

1—Brownie Hoist, Model HKM, Ser. No. 6801.
2—Brownie Hoists, Model HKL, Ser. No.'s: 6856-6320

CUTTING MACHINES FOR SALE

1—312 AA Cutting Machine, 250 Volts D.C. Excellent Condition.
7—35L Jeffrey Cutting Machines, 250 Volts D.C., with 7 ft. Cutter Bars. Excellent.
3—11BU Joy Cutting Machines, 250 Volts D.C. with 9 ft. Cincinnati Bar, Chain, and Bugduster. Excellent condition.
1—5B Baby Sullivan Cutting Machine. Excellent condition.
1—10RU Joy Cutting Machine, 220/440 Volts A.C., with reel and trailing cable.
2—512 Goodman Cutting Machine, 220/440 Volts A.C. Excellent condition.
6—7B Sullivan (Jog) Cutting Machines, 220/440 Volts A.C. Excellent condition.
1—11B Joy (Sullivan) Cutting Machines, 250 V. D.C. 7½' bar. Cincinnati Chain.
2—35BB Jeffrey Cutters, 250 V., D.C. 8½' cutter bars.
2—35BB Jeffrey Cutters, 250 V., D.C. 8½ cutter bars.
1—512 CH Goodman Cutters, 250 V., D.C., permissible, 9 ft. cutter bar.
14—512 DA Goodman Cutters, permissible 8½' cutter bars.
3—12 AA Standard Goodman Cutting Machines.
2—7AU Sullivan Cutter, 250 volts D.C.

GENERATORS FOR SALE

1—200 KW Ridgeway Motor Generator Set, complete with switchgear and 1600 amp. I-T-E automatic Circuit Breaker, 2300 AC, 275 volts DC.
1—200 KW Ridgeway Motor Generator Set, 900 RPM, complete with manual breaker, AC, and DC switchgear, 2300/4000 V., AC 275 volts DC.
1—Diesel Power Plant, consisting of 165 H.P. Cummins Diesel Engine direct connected to 100 KW G.E. Generator, Complete with switchgear and panel board.
3—50 KW G.E. Motor Generator Sets, 2300 volts AC, 275 V., DC, Complete with switchgear.
1—50 KW Westinghouse Motor Generator Set, 2300 volts AC, 275 V., DC, Complete with switching gear.
1—150 KW Westinghouse Motor Generator Sets 2300 Volts AC, 275 volts DC. Complete with switching gear.
1—300 KW Westinghouse Motor Generator Set, synchronous motor number 2589701, 433 KW output 435 KVA 2200 volts, 113 amp., 1200 RPM, input power factor 8, 3 phase 60 cycle, DC generator number 2590799, 300 KW 275 volts, 1200 RPM, 1200 amp., S.O. #3813216 compound wound. Complete with DC panel and switchgear.

COMPRESSORS FOR SALE

1—KW 85 Joy Air Compressor, rubber tire mounted, self-propelled, 28½" high, model 240, maximum pressure 100 pounds. Excellent condition.
3—Acme Self-propelled Air Compressors, 83 R, Model 168, Capacity 176 C.F.M., with 40 H.P. Reliance Compound Motors.

RECTIFIER FOR SALE

1—300 KW, 275 Volt D.C., Westinghouse 2 car portable ignitron rectifier, 2300/4000/4160 primary voltage, 54" high. Like New.
2—300 KW General Electric Stationary sealed ignitron rectifiers, 2300-4000-4160 primary and 275 volts DC secondary. Complete with switching equipment and associated controls.

COAL DRILLS FOR SALE

25—CP-472 Electric Coal Drills, 250 V., DC.
2—CD-22 Joy Coal Drills, rubber tire mounted, self-propelled, 250 volts D.C.

LOCOMOTIVES FOR SALE

1—13 Ton Jeffrey Locomotive, Ser. No. 2304 Type MM-74, 42" t.g., Ht. 38". Controlled MB-36-E.
1—10 Ton Goodman Locomotive, Ser. No. 4371, Type 32A-04-T, 250 V., 42" t.g., Ht. 34".
1—10 Ton Goodman Locomotive, Ser. No. 4191, Type 32A-04-T, 250 V., 42" t.g., Ht. 34".
1—927 LD Westinghouse Locomotive, 10 ton rated, 48" track gauge, hydraulic brakes and sander, dynamic brakes, contractor control and spring bumpers.

ROCK DUSTERS FOR SALE

1—American Mine Door Bantam type Rock Duster, Type A, 220/440 Volts AC, 18½" high.
1—American Mine Door wheel mounted Bantam type Rock Duster, 250 V., DC, 22" high.
1—MSA Track Mounted Rock Dusters, 19 H.P. AC 20 H.P., high pressure. Permissible. Any gauge, 38" high.
1—MSA Track Mounted Rock Duster, 10 H.P. AC or DC. High Pressure. 30" high, any gauge.

CRUSHERS FOR SALE

1—Bended Crusher, size 24" x 24", complete with 30 H.P. Motor. Like New.
1—McNally-Pittsburg, 36" x 48" double roll crusher, Serial No. 124T5323B. Stoker.
1—McLanahan (Bantam Buster) single roll crusher, Size 24" x 48", Serial No. B3438.
1—Scottdale Crusher 20" x 30", double roll.

CONVERTER FOR SALE

1—150 KW Rotary Converter, Serial No. 1054562, with 150 KVA transformer, No. 1512723, and panel boards.

CAT TRUCKS FOR SALE

2—T2-5APE Low Pan Joy Cat Trucks, 250 Volt D.C. Rebuilt.
1—T2-3E Joy Cat Truck, 250 Volts D.C.

ALL EQUIPMENT IS LOCATED ON OUR YARDS AT RALEIGH, WEST VIRGINIA AND IS SUBJECT TO INSPECTION
ALL EQUIPMENT IN EXCELLENT OPERATING CONDITION

MOUNTAIN STATE EQUIPMENT COMPANY

P. O. Box 1050
J. J. Mahoney
Res. Phone CL 3-6804
Beckley, W. Va.

Beckley, West Virginia
William R. Monk
Res. Phone CL 3-6907
Beckley, W. Va.

Phone CLifford 3-7383
R. E. Kamm
Res. Phone 4281
Summersville, W. Va.

RAVEN MINING EQUIPMENT COMPANY

Good Used Equipment—Priced to Save You Money

A "Fair Deal" or "No Deal" at "RAMECO"

Complete Cleaning Plant — Roberts & Schaefer 48" Single Tandem Pre-Engineered.
Hydro-Separator — 100 TPH 3 by ⅜" Coal — Excellent Condition — Complete.
Link-Belt Tippie Equipment — Main Shaker — Feeder.
Conveyors—Assorted Screens—Loading Booms, Car Retarder — Elevator.
Viking Hot Oil Coal Treating Equipment.
Truck Scales.
Jeffrey Single Roll Crusher.
Stats Lorry.
Scoopmobile.
2—15 KVA Capacitors.
1—1600 Amp. DC Automatic Breaker.
3—HKL Car Spotting Hoists — AC.
1—HKL Car Spotting Hoist — DC.
2—Sullivan Hoists — DC.
5—G-12½ Goodman Shaker Conveyors.
1—G-15 Goodman Shaker Conveyor.
1—LaDel Shaker Conveyor.
2—L-14 Goodman Shaker Conveyors with Built-in Winch — 20" Over-all.
3—Size 1½ Duckbills and Swivels.
2—Size 1 Duckbills and Swivels.
Shaker Conveyors can be furnished with all accessories — Size 1 or 1½ Column or Regular Type Pans 10 to 13' length.
2—6I-AM Chain Conveyors.
1—Face Conveyor.
DC Benders — AC Welders.
1—Drag Cable Motor — Rubber Tired — DC.
5 by 7 Rubber Tired Mine Cars — 23" high.
1—10 ton Warehouse Locomotive.
1—8 ton Goodman Locomotive.
Goodman Gathering Locomotives—3 and 5 ton.
Jeffrey MH 88 and 96 Gathering Locomotives.
Trolley Wire and Fittings.
1—Tank Car Type Storage Tank.
1—Open top 4000 Gal. Steel Tank.
AC and DC Motors — Air Cooled Gas Engines.
Locomotive Trucks — Tires.
New and Used Supplies.
Treated Power Poles — Fittings.
Mine Cars — 23" Above Rail — End Dump.
Shop Equipment — Chain Blocks,
Edison Lamps — Chargers.
2—Goodman 212-AA Machines — DC.
1—Goodman 212-AA Machine — AC.
1—Goodman 312 Machine — DC.
1—Jeffrey 24-B Machine — DC.
1—Sullivan CR-10 Machine — DC. — 16" high.
1—Sullivan CE-5 with Truck.
1—2 by 6 AERO-Vibe Screen.
1—5 by 14 Ripple Flow Screen.
1—5 by 14 Hewitt-Robbins Screen.
Transformers — 1050—75 KVA.
20 and 25# Switches—Ties 42-44-48 Gauge.
Plates and Angle Bars.
Complete Sub Stations 100 KW to 300 KW.
1—Diesel Power Plant.
Coal Drills — Drill Presses — Grinders.
Pumps — Blowers — Fans — Jacks.
Laboratory Equipment — Grinder — Pulverizer.
Trucks and Pony Trucks for Cutting Machines.
42", 44" and 48" Gauge Drop Bottom Mine Cars.
Coal Silos.
Railway Car Shakeouts.
1—Buddy Sullivan 5-BI Machine with Truck.
1—Jeffrey 35 L Cutting Machine.
End Dump Mine Cars 42", 44" and 48" Gauge.
Flame Safety Lamps.
First Aid Supplies.
2—Shop-made Shakers ¾" Round Hole Screens.
Mail us list of your idle or surplus equipment — we may have a home for it.

Come to See Us — Highway 460 — N&W Railway — We Will Try to Help You

One Mile From Richlands, Virginia Airport — Elevation 2000 — Runway 1800

C. T. ADAIR, MAIL: RAVEN, VIRGINIA—WIRE: RICHLANDS, VIRGINIA
TELEPHONE, RICHLANDS, VIRGINIA—DAY 5505—NIGHT 5521

POWER EQUIPMENT CO.
Offers
BARGAIN PRICES
ON
GUARANTEED
NEW and Rebuilt MOTORS!

FEBRUARY SPECIALS
REBUILT MOTORS

HP	MAKE	TYPE	SPEED
250	L.A.—Drip-R.B.	OGX	1800
150	G.E.-T.E.F.C.B.B.-XP	K-6328	3600
40	L.A.-T.E.F.C.B.B.-XP	EX-405	1800

Send for our FREE Catalog

Cash for your surplus new & used electric equipment. Send your list today.

Large line of motors, control equipment, AC & DC Generators, MG sets and transformers.

Phone or Wire Us Collect

POWER EQUIPMENT CO.
8 Cairn St., Rochester 2, N. Y.
Phone Genesee 8-5629

FOR SALE

111 M Marion High Lift Front End with 3½ yard dipper, complete with new Creed Chains and Fawick Clutch, good condition. Located in Southern West Virginia. Phone Man, West Virginia 9229 or New Port Richey, Florida, 4212.

Bailey Production Corporation

7 yd. PAGE, walker
perfect condition
New Bucket
SERODINO, INC.
8176 Vine Street
Cincinnati 16 Ohio
Valley 1-3161

MODERN MINING EQUIPMENT

TRACKLESS EQUIPMENT

1—T2-5 Joy Cat Truck
1—Lee Norse Continuous Miner
4—14BU 7RBE Joy Loaders
1—14BU 7CE Joy Loader
2—14BU 3PE Joy Loaders
2—12BU 9E & 7E Joy Loaders, Rebuilt & Reconditioned
2—6BU 500 volt DC
2—8BU 250 Volt DC—Rebuilt
2—Myers Whaley, #3, Loaders
2—6SC Joy Shuttle Cars
2—10SC Joy Shuttle Cars Modern
3—12D Joy Shuttle Cars
2—12E7 Joy Shuttle Cars
4—12E10 Joy Cars—Rebuilt
1—12E16 Joy Shuttle Car
1—29U Jeffrey, Rubber Mtd.
1—PL11-7PE Joy Elevator
1—PL11-8PE Joy Elevator
2—40 H.P., Acme Self-propelled Air Compressors—permissible
1—360 Goodman Loader
2—Baker-Raulang Battery Tractors
3—Joy T12 Battery Supply Jeeps, Complete with Batteries & Chargers
1—RBD Chicago Pneumatic Roof Bolting Machine
3—MSA Bantam Rock Dusters on Tires

CONVEYORS

1500'—36" Joy Limberoller Belt Conv., Complete with belting—unit almost new—part of structure never used.
2028'—36" Joy Belt Conv., with Belt
10—36" Joy Belt Drives with or without Motors
2600'—36" Barber Green Belt Conv., Complete with belt & drive, extra Heavy duty—Excellent Cond.
10,500'—36" Jeffrey 52B Structure with or without Belt
3000'—36" Joy MTB Structure with or without Belt
3340'—30" Barber Green Structure with or without Belt
600'—30" Goodman, 97C Structure with or without Belt
2—30" Joy 40 H.P., AC or DC Belt Drives
9500'—30" Conv. Belting good condition
10,070'—26" Joy Belt Conv., with or without Belt
1000'—26" Jeffrey 52B Belt Conv., Complete
43—26" Belt Drives of Various Types
500'—24" Goodman Belt Conv., Complete
13—20" Joy Chain Conv., Permissible
3—13" Joy Chain Conv., Permissible
18—15" & 12" 61EW, 61HG, 61W, & 61AM Jeffrey Chain Conv.
52—G12½, G15, & G20 Goodman Shakers, AC & DC
2—PT12 Long Piggyback Conv.
31—Goodmans Power Duckbills Model 477

CUTTING MACHINES

4—7AU Track Mtd. Sullivans
3—7B Sullivans
12—11B Sullivans 35 & 50 H.P.
8—12AB & 12AA Standard Goodmans
5—12AA Universal Goodmans
21—212AA Baby Goodmans, 250 V.

CUTTING MACHINES CONT'D

1—212G3 Baby Goodman, 220/440 V.
9—512 Goodmans, 2 w/Buggdusters
2—712 Goodmans
1—824 Goodman, 42" t.g.
1—29U Jeffrey Arc Wall
1—29U Jeffrey 220/440 V., 42" t.g. Excellent
1—29UR Jeffrey, Rubber Mtd.
52—35B & 35BB Jeffrey Both AC & DC w/Buggdusters & Trucks Available.

LOCOMOTIVES

1—3 Ton Locomotive, 250 V., 36" t.g.
22—4 Ton Locomotives, 250 V., Any gauge
1—5 Ton Locomotive, 250 V., 42" t.g.
55—6 Ton Locomotives
1—6 Ton Battery Locomotive—New
1—7 Ton Jeffrey
20—8 Ton Locomotives, 250 V., Any gauge
7—10 Ton Locomotives, 250 V., Any gauge
21—13 Ton Locomotives, 250 V., Any gauge

MINE CARS

39—36" t.g., Drop Bottoms
233—42" t.g., End Dumps, Various Sizes
33—44" t.g., Drop Bottoms, 10 Ton
174—44" t.g., Drop Bottoms, Various Sizes
505—44" t.g., End Dumps, Various Makes & Sizes
60—48" t.g., S.D., Drop Bottoms

SUBSTATIONS & TRANSFORMERS

2—40KW Rotary Converters
1—75KW Bude Diesel w/250 V., Generator
1—100KVA Gasoline Generator Unit
1—100KW Bude Diesel w/250 V., Generator
1—150KW Rotary Converter—Completely Automatic
19—150KW, MG Sets of various makes & Primary Voltage
4—200KW MG Sets
2—300KW, G.E., MG Sets 2300/4000/275 V.
2—300KW, G.E., MG Sets 2300/4000 V., With boards
2—500KW, G.E., MG Sets 2300/4000/275 V.
2—Armatures for 150 & 200 KW Rotary
2—600 & 800 KVA Auto. Transformers
106—Transformers of Various Sizes

TIPPLE EQUIPMENT

2—Complete Tipples, including Cleaning Plant Conveyors, crushers, bin, etc.
3—American Air tables for stoker & carbon
1—4 Cell Jeffrey Baum Jig washer—may be seen operating
2—CMI Coal Dryers 48", Excellent Condition
2—Heat Dryers complete
1—Marion Double Roll Primary Crusher
1—24" x 50" Penn. Single Roll Crusher
1—36" x 36" Double Roll Crusher
1—24" x 30" Double Roll Crusher
1—24" x 24" Single Roll Crusher
1—24" x 20" Jeffrey Fixatooth Crusher
1—18" x 12" Jeffrey Swing Hammer Pulversizer
1—5' x 14' Allis Chalmers Double Deck Vibrator
2—4' x 12' Allis Chalmers Double Deck Vibrator
1—3" x 8' Allis Chalmers Low Head Vibrator
10—Jeffrey Traylor Vibrator Feeders

TIPPLE EQUIPMENT CON'T

1—Magnetic Separator Complete
1—Set Jeffrey Dewatering Screens
1—Hi-Pressure Oil Spray & 5 Oil Tanks
14—Scraper Conveyors of Various Sizes
32—Tipple Belts from 15" to 42" width & Various lengths
5—Loading Booms with Hoists, Air Valves, Blowers, Pumps, New Screens, Parts for CMI Dryers, Speed Reducers and many other parts for Tipple Equipment

RAIL & WIRE

35 Tons—16 Lb. Rail
3390 Tons—20, 30, 56, 70, and 85 Lb. Relaying Rail
2000'—1,000,000 CM Aluminum Insulated Feeder Cable
15,815'—750,000 CM Insulated Copper Feeder Wire
13,550'—500,000 CM Insulated Copper Feeder Wire
17,000'—350,000 CM Rubber Covered & Insulated Copper
80,000'—4/0 Rubber Covered & Insulated Copper
48,000'—6/0 Trolley Wire
142,354'—4/0 Trolley Wire
56,000'—2/0 Solid Copper Transmission Line
205,500'—#2 Solid Copper Transmission Line
30—Spools New Telephone Wire

MISCELLANEOUS

1—800 H.P., Single Drum Hoist
1—300 H.P., Single Drum Hoist
1—100 H.P., Single Drum Hoist
97—Hoists from 5 H.P. to 800 H.P.
1—800 H.P., Motor
1—500 H.P., Motor
2—300 H.P., Motors
564—Stationary Motors—½ H.P., to 300 H.P. of Various specifications
1—1200 GPM Cent. Pump
1—1000 GPM Cent. Pump
2—800 GPM Cent. Pumps
1—600 GPM Cent. Pump
83—Pumps from ¾" to 1200 G.P.M. Various Specifications
25—Mine Fans from 30" to 6' Hi-Pressure
235—Coal Drills—571 C.P. 572 C.P. A6 & A7 Jeffrey
13—Scales for Mine Tracks & Trucks
22—Air Compressors of Various Sizes
4—Dozers D4, D7, & HG7
1—Model 12 Caterpillar Road Grader Excellent
8—Rock Dusting Machines up to 30 H.P.
300—Safety Lamps with Chargers
57—Automatic Starters from 3 H.P., to 100 H.P.
1—Sullivan Bit Sharpener
1—Dust Collector for Underground Use
2500—New ⅝" x 36" Roof Bolts with Plates
Shop Machinery Lathes, Pressure Drills, Grinders, Welders, Shapers, & etc.

ALL INQUIRIES WILL BE ANSWERED PROMPTLY
Call, Write or Wire us, Day or Night

ELECTRIC & MACHINE SUPPLY COMPANY
MINING & INDUSTRIAL EQUIPMENT

Whitesburg, Kentucky
P. O. Box 610—Phone 2223—TWX #367
BILL CONLEY

Clarksburg, West Virginia
P. O. Box 227—Phone MA 3-0253 TWX #CB59
MELVIN ADAMS — H. J. (HANK) UBBING

Save on Your
INDUSTRIAL
TRACK
FULLY
GUARANTEED
FOSTER
QUALITY
RELAYING RAILS
Handle more cars better—cost less to install and maintain. Foster stocks all Rail Sections 12# thru 175#, Switch Material and Track Accessories.
SEND FOR CATALOGS
RAILS - TRACK EQUIPMENT - PIPE - PILING
L B FOSTER co.

-TRANSFORMERS-
BOUGHT AND SOLD

We carry a large stock of rebuilt and guaranteed transformers, and invite your inquiries.
Custom-built transformers and coils manufactured to your specifications.
Expert Repair Service—all makes and sizes of transformers rewound, repaired and redesigned. Ask for our price schedule.

THE ELECTRIC SERVICE CO., INC.
5322 Hetzel St. — Cincinnati 27, Ohio
45 Years' Dependable Service

MOTORS • GENERATORS
TRANSFORMERS • M-G SETS • CONTROLS
New • Rebuilt • Bought • Sold
PREFERRED *Electric Motors Inc*
P. O. Box 767 Rochester 3, N. Y. Ph. HA 6-3420

FOR SALE
Bucyrus 9-W, diesel dragline 165' boom 9 yd. bucket, excellent condition, Western Penna. $175,000 includes approx. $20,000 spare parts.
ROLLING HILLS CONT. CO.
884 Edgewood Ave. Pittsburgh 34, Pa.

—ADVERTISERS IN THIS ISSUE—

***Indicates more product information may be found in company advertising appearing in COAL AGE 1957 Mid-July Mining Guidebook and Buying Directory Issue. Check your Guidebook index.**

*Aeroquip Corp. 46
Aldon Co. 174
*Allegheny Ludlum Steel Corp. 161
*Allis-Chalmers Manufacturing Co. General Products Div. 144
*ACF Industries Inc. American Car & Foundry Co. ..... Third Cover
American Brattice Cloth Corp. 68
*American Cyanamid Co. 177
*American Pulverizer Co. 198
*American Steel & Wire Div. U. S. Steel Corp. 18–19
*Anaconda Wire & Cable Co. 165
Armstrong-Bray & Co. 196
Ashland Oil Co. 197
*Austin Powder Co. 94

Baldwin-Lima-Hamilton Construction Equipment Div. 121
Bethlehem Steel Co. 15, 107, 159, 176
Bird Machine Co. 4
Boston Woven Hose & Rubber Co. 151
Bucyrus-Erie Co. 67, 142

Caterpillar Tractor Co. 58–59, 171, 210
*Centrifugal & Mechanical Industries, Inc. 21
*Cheatham Electric Switching Device Co. 152
Chevrolet Div. General Motors 139
*Chicago Pneumatic Tool Co. 179
*Cincinnati Mine Machinery Co. 153
Coal Age 138
Colorado Iron Works 200
Continental Gin Co. 70

*Daniels Co., Inc. 157
*Dart Truck Co. 175
Deister Concentrator Co. 56
*Denver Equipment Co. 196
Dodge Manufacturing Co. 158
Dorr-Oliver, Inc. 25
*Dravo Corp. 66
*Duff-Norton Co. 150
duPont de Nemours & Co., E. I. (Elastomers Div.) 43
duPont de Nemours & Co., E. I. (Explosives Div.) 57

Eaton Manufacturing Co. 188
Ensign-Bickford Co. 74
*Enterprise Wheel & Car Corp. 93
Euclid Div. General Motors Corp. 65
*Exide Industrial Div. Electric Storage Battery Co. 192

Fairmont Machinery Co. 17
Fairview Bit Co. 64
Falk Corp. 95
Firth Sterling, Inc. 51
Flexible Steel Lacing Co. 194
Ford Motor Co. 90–91
Fuller Macufacturing Co. 62–63

Gates Rubber Co. 52
General Tire & Rubber Co. 54–55
GMC Truck & Coach Div. General Motors 118
Goodman Manufacturing Co. 47
Goodrich Industrial Products Co., B. F. 1
Goodrich Tire Co. Div. B. F. Goodrich Co. 181
Goodyear Tire & Rubber Co. 13
*Gundlach Machine Co., T. J. 29
Guyan Machinery Co. 50, 68

Hamilton Rubber Co. 209
*Harnischfeger Corp. 34–35
*Hendrick Manufacturing Co. 64
Hendrix Manufacturing Co., Inc. 20
*Hercules Powder Co. 120
*Heyl & Patterson, Inc. 71
Hough Co., Frank G. 103
*Huber-Warco Co. 189, 191
Hulburt Oil & Grease Co. 2–3

Ingersoll-Rand Co. 201

Jeffrey Manufacturing Co. 72–73
*Joy Manufacturing Co. 22–23, 116, 167

Kelly Manufacturing Co. 174
*Kennametal, Inc. 190
Kersey Manufacturing Co., Inc. 14

Lee-Norse Co. 10
*Leman Machine Co. 163
*LeRoi Div. Westinghouse Air Brake Co. 135
LeTourneau-Westinghouse Co. 129, 131, 133
*Link-Belt Co. ..... Fourth Cover, 183
*Long Co. 199

Macwhyte Co. 27
*Mack Trucks 122
*Manitowoc Corp. 136
Marietta Concrete Co. 194
*McLanahan & Stone Corp. 33
McNally Pittsburg Manufacturing Co. 37, 38–39, 40–41, 42, 184
*Merrick Scale Manufacturing Co. 44
Metallurgical Products Div. General Electric Co. 146–147
*Mine Safety Appliances Co. ..... Second Cover

*Nachod & United States Signal Co., Inc. 152
National Mine Service Co. 6
National Tube Div. 92
*Nolan Co. 195

Ohio Brass Co. 112–113
Okonite Co. 123
*Paris Manufacturing Co. 50
Post Glover Electric Co. 156
Porter Co., Inc., H. K. Leschen Wire Rope Div. 187
Quaker Rubber Div. 186

Republic Steel Corp. 48–49
Rockbestos Products Corp. 137
Roebling Sons Corp., John A. 193

Scandinavia Belting Co. 16
Schroeder Bros. 44
Searchlight Section 203–207
Simplex Wire & Cable Co. 31
Sinclair Refining Co. 185
*Stamler Corp., W. R. 43
Standard Oil Co. of Indiana 45

*Templeton, Kenly Co. 152
*Texas Co. 8–9
Thermoid Co. 119
Thurman Machine Co. 174
Torrington Co. 109

United States Rubber Co. Mechanical Goods Div. 169
*United States Steel Corp. 60, 172

*Wedge-Wire Corp. 36
*White Diesel Engine Div. White Motor Co. 53
Whitney Chain Co. 69
Wickwire Spencer Steel Div. Colorado Fuel & Iron Corp. 24
Wild Heerbrugg Instruments, Inc. 61
Wilfley & Sons, Inc., A. R. 173
Winslow Government Standard Scale Works 196

PROFESSIONAL SERVICES 203

CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES 204
SPECIAL SERVICES 204
BUSINESS OPPORTUNITIES 204
EQUIPMENT (Used or Surplus New) For Sale 204–207
WANTED Equipment 204

ADVERTISING SALES STAFF

Atlanta 3 ..... M. H. Miller, 1301 Rhodes-Haverty Bldg., Jackson 3-6951

Chicago 11 ... G. A. Mack, F. W. Roets, 520 N. Michigan Ave., Mohawk 4-5800.

Cleveland 13 .. J. E. Lange, 55 Public Square. Superior 1-7000

Dallas 1 ..... G. Miller, 1712 Commerce St., Riverside 7-3521

Denver 2 ..... J. W. Patten, Mile High Center, 1740 Broadway, ALpine 5-2981

Los Angeles 17 ..... J. B. Uphoff, 1125 W. 6th St., Madison 6-9351

New York 36 .. H. C. Chellson, G. P. Lutjen 500 5th Ave., Oxford 5-5959

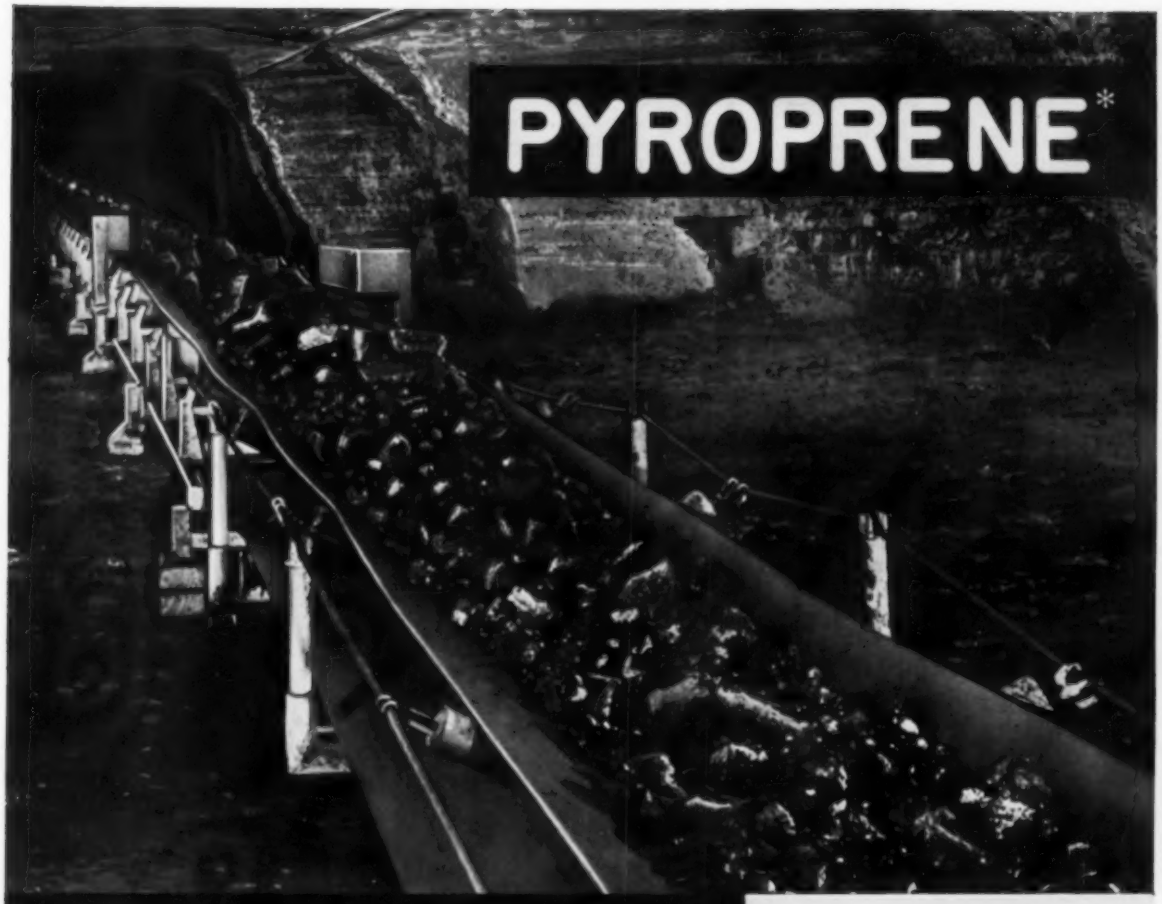
Pittsburgh 22 ...Wm. H. H. Grinder, 1111 Oliver Bldg., Atlantic 1-4707

Philadelphia 3 ... J. B. Lewis, Architects Bldg., 17th & Sansom Sts., Rittenhouse 6-0670

St. Louis 8 ..... F. W. Roets, Continental Bldg., 3615 Olive St., Jefferson 5-4867

San Francisco 4 .... J. W. Otterson, 68 Post St., Douglas 2-4600

London EC 4, England ..H. Lagler, McGraw-Hill Co., Ltd., 95 Farringdon St.



Hamilton Pyroprene* belt won't add fuel to the fire

Fire hazard and damage is greatly reduced when Hamilton fire-resistant Pyroprene belt is on the job. Accepted for listing by the Bureau of Mines, Pyroprene will not promote burning. Danger of fire spreading along belt is completely eliminated . . mine safety and production are safeguarded.

Important, too, is Pyroprene's remarkable ability to withstand crushing impacts at coal loading points. The special Neoprene compound used in Pyroprene belts also resists abrasion, cutting, gouging and chipping. Oil, dampness and mildew cannot penetrate its rugged cover. This means longer service life, less maintenance and more tonnage per hour. Write Hamilton, Dept. C-101 for details.

*Acceptance designation "Fire Resistant, U.S.B.M. No. 28-7" January 27, 1956.

Hamilton Rubber

MANUFACTURING CORPORATION, TRENTON 3, N. J.

A Division of Acme-Hamilton Manufacturing Corporation

Use Hamilton by choice . . .

not by chance

ATLANTA CHICAGO CLEVELAND HOUSTON PITTSBURGH INDIANAPOLIS LOS ANGELES NEW YORK SAN FRANCISCO

Haul big loads fast

with this big yellow team

At work for the Truax-Traer Coal Co. at Fiatt, Ill., eleven such DW20-PH20 rigs carry 45 tons of coal each. They make a 6.8-mile round trip to the hopper every 20-25 minutes. "They are very satisfactory in every way. They ride easy and operate easy," says Gene Long, assistant superintendent.

What do you want in a coal hauler? Big capacity? Speed? Economical operation?

You want them all—and you're sure of getting them with the mighty team of CAT DW20 Tractor and Athey PH20 Coal Hauler. Here's why:

Big Capacity — The PH20 can carry loads of 45 tons of coal on every trip from shovel to hopper.

Speed—Powered by a turbocharged 300 HP (maximum output) Caterpillar Engine, the DW20 gives you the added rimpull needed to overcome grades out of the pit and rolling resistance on rough roads. But most important, the power of the DW20 is *matched* to the 45-ton capacity of the Athey PH20. This rig really *moves.*

Economical Operation — Caterpillar features low-cost operation — as examples: ability to use low-cost fuels without fouling and tubeless tires that eliminate 80% of tire down time. But the most important is simply—Caterpillar quality. The rig is built to *stay* on the job, year after year.

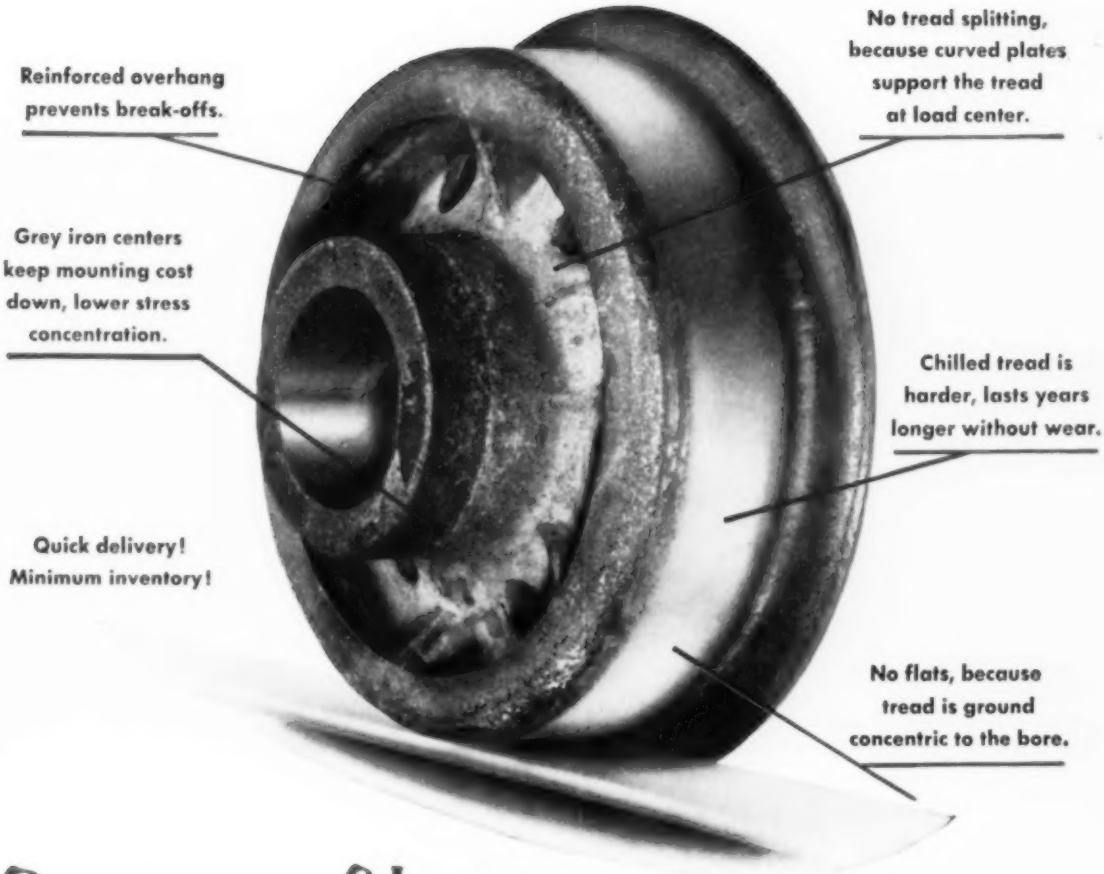
Let your Caterpillar Dealer prove the dollars-and-cents profit to you of the DW20-PH20's durability with actual production figures. Then have him demonstrate right on your job. And remember, you're dealing with a man who will be able to back your investment with expert, reliable service and quality Caterpillar parts.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

BIG-CAPACITY, HIGH-SPEED, LOW-COST COAL HAULING


Reinforced overhang prevents break-offs.
No tread splitting, because curved plates support the tread at load center.
Grey iron centers keep mounting cost down, lower stress concentration.
Chilled tread is harder, lasts years longer without wear.
Quick delivery! Minimum inventory!
No flats, because tread is ground concentric to the bore.

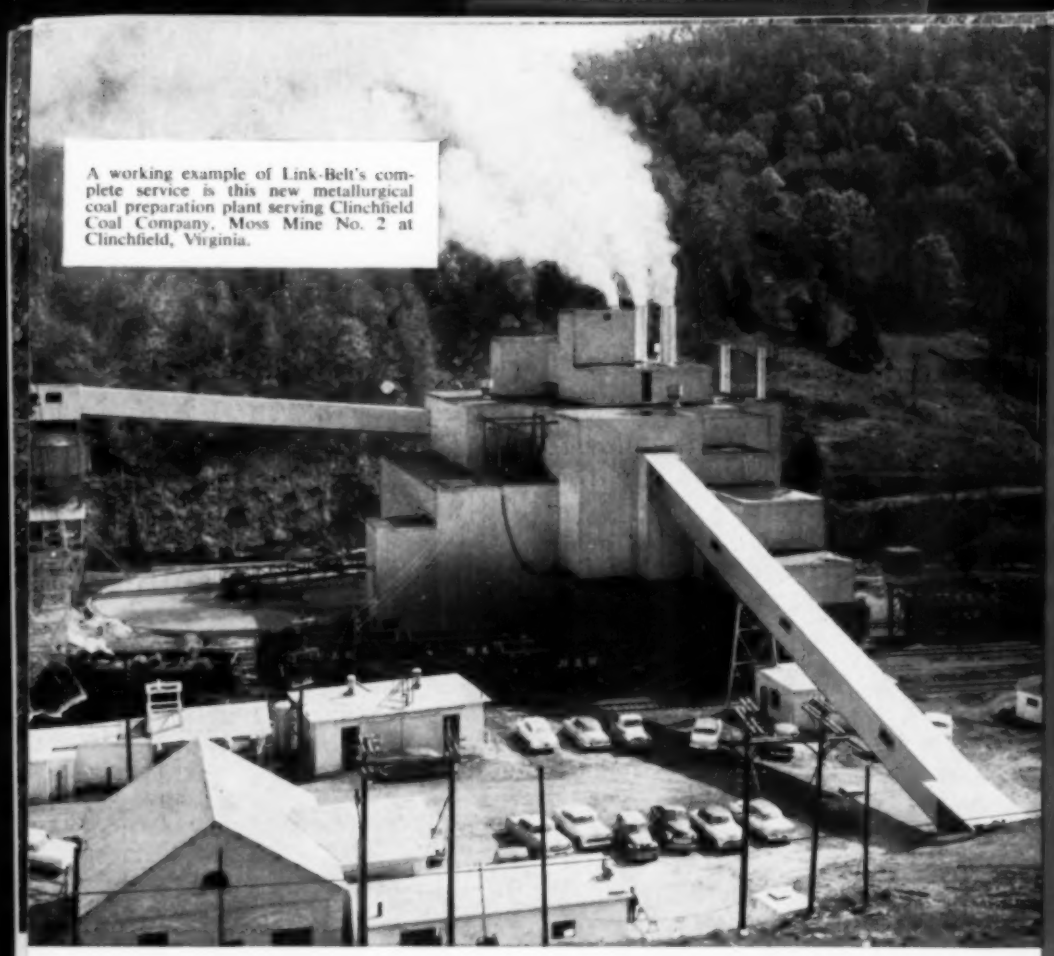
Center of Interest

for cost-conscious operators!

In mine after mine, acf *Load-Support* Chilled Tread Mine Car Wheels give millions of ton-miles of low-maintenance service! Extra quality in every feature gives longer service in every use, minimizes haulage delays for wheel repairs, lowers mine car wheel inventory requirements. Ask your American Car and Foundry representative for facts and figures! AMERICAN CAR AND FOUNDRY, Division of acf Industries, Incorporated, 30 Church Street, New York 8, N. Y. *Sales Offices:* New York–Chicago–St. Louis–Cleveland–Washington, D. C.–Philadelphia–San Francisco–Berwick, Pa.–Huntington, W. Va. *Plants:* Berwick, Pa.–Huntington, W. Va.–St. Louis, Mo.

acf
AMERICAN CAR AND FOUNDRY
DIVISION OF ACF INDUSTRIES, INCORPORATED

LOAD SUPPORT MINE CAR WHEELS



A working example of Link-Belt's complete service is this new metallurgical coal preparation plant serving Clinchfield Coal Company, Moss Mine No. 2 at Clinchfield, Virginia.

LINK-BELT offers one source...

components or complete plants

for modern coal preparation

THE up-to-date plant pictured above is one example of Link-Belt's ability to completely design, equip, and erect coal preparation facilities. With over 60 years' experience and a complete line of components, we are in a unique position to fulfill all your needs. And, as a "single-source" Link-Belt will accept full responsibility for the satisfactory performance of the plant.

If there is need for modernizing your present installation, Link-Belt can supply you with components engineered to bring new efficiency to your operation.

Take advantage of this experience by calling your nearest Link-Belt office for an obligation-free analysis of your specific needs. Ask for Link-Belt's new coal preparation Book 2655.

LINK-BELT

COAL PREPARATION AND HANDLING EQUIPMENT

LINK-BELT COMPANY: Chicago 9, Birmingham 3, Cleveland 20, Denver 2, Detroit 4, Huntington 9, W. Va., Indianapolis 6, Kansas City 8, Mo., Louisville 2, Pittsburgh 13, Seattle 4, St. Louis 1, Scarboro (Toronto 13), Springs (South Africa). 14,859